NOTE

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MONDAY, NOVEMBER 4, 1991 Volume 221, No. 19

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

Trying to fit ISDN into the the network of the future has become a perplexing task. The technology hasn't lived up to the fanfare that preceded it, but it still has a place in the network scheme of things. Cover photo by Phil Jason, Tony Stone Worldwide

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TELEPHONY (ISSN 0040-2656) is published weekly (except for a combined issue the last week of December) for $45.00 one year, $70.00 two years. Outside U.S. $80.00 one year. Air mail for $185.00 for U.S., $225.00 for Canada. Air Express one year outside U.S. and Canada for $150.00. Single copies $3.00 each (payable in advance); outside U.S. add $1.00. Subscription rates apply to employees of operating telephone companies, telephone consultants, contractors, interconnect companies, specialized common carriers, military, government, associations, private communications users, schools, libraries. Published by Intertec Publishing Corp., 9221 Quivira Rd., Overland Park, KS 66215. Second-class postage paid at Chicago, IL and additional mailing offices. POSTMASTER: Send address changes to TELEPHONY, P.O. Box 12960, Overland Park, KS 66282-2960. Copyright 1991 by *Telephony* Division, Intertec Publishing Corp. All rights reserved. Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by *Telephony* for libraries and other users registered with the Copyright Clearance Center provided that the fee of $1.50 per page is paid directly to CCC, 21 Congress St., Salem, MA 01970. Special requests should be addressed to the publisher.

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Putting together the pieces of the ISDN puzzle

JOHN WILLIAMSON, International Editor

Although the narrowband integrated services digital network has consistently failed to live up to the promises of its architects, the word on the street is that it is a big mistake to write the technology off. At the same time, though, hardly anyone now sees ISDN as the universal, all-purpose digital network of the future.

Devised in the 1970s and progressively standardized throughout the subsequent decade, ISDN has been hyped up by some and flatly dismissed by others.

Given ISDN's failure to remotely approach original installation targets or make any serious commercial headway in the 1980s, skeptics have tended to have the stronger argument so far. In this context, a new report from the International Telecommunications Users Group (Intug) notes that less than 20% of International Telecommunication Union members plan to implement ISDN, and the other 80% is "largely ambivalent or hostile."

Analyses of what went wrong are not in short supply, and there is general consensus on the main reasons why ISDN growth has been inhibited.

Tell Me Why

Those reasons include lack of user awareness and applications, the incomplete nature of the applicable standards, the absence of customer premises equipment in quantity, and unattractive or confusing tariff structures.

The first of these is perhaps the most important. "There is no clearly focused, widely shared, vision of the applicability of ISDN among potential users" says the Intug report.

Although the telecom industry's familiarity with ISDN may be on the verge of breeding contempt, the vast majority of would-be customers apparently are ignorant of the technology and its advantages. "There is still a lot of education to do on the benefits of ISDN. People in the industry understand it, but customers don't necessarily," says Grace Blackburn, manager of Mercury's new Switchband international dial-up, bandwidth-on-demand service.

Bandwidth-on-demand, which some observers see as having a negative impact on the market for ISDN in the longer term, appears to be better understood. A Mercury poll found that 73% of respondents were interested in the Switchband offering.

Another problem for ISDN is that, despite all the hyperbole, it does not neatly fill a vacuum in the marketplace. "A new network in general always presents a problem if it doesn't replace an existing network," notes Hans Baur, executive vice president of Siemens.

Meanwhile, since international and multinational enterprises are likely to feature prominently in the first wave of ISDN consumers, slow progress toward the interconnection of national services has not been helpful. British Telecom claims the world record among operators, with international ISDN connections to 14 countries and 24 networks.

"Interconnection of ISDN internationally, also nationally to pre-ISDN voice and data networks, is of great importance to users, especially in the migration period. This important aspect seems not to be getting the attention it deserves," notes the Intug report.

Initial responses to the latest European Commission scheme to

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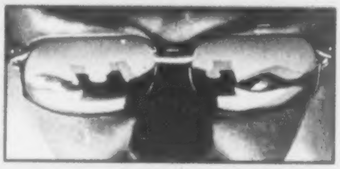
Although the telecom industry's familiarity with ISDN may be on the verge of breeding contempt, the vast majority of would-be customers apparently are ignorant of the technology and its advantages.

Developing secure systems

VIRGINIA LACKER

With the emergence of ISDN standards, vendors and users have changed their approach toward telecommunications. The integrated services digital network provides users with access to voice, data, image, video and multimedia applications. The "user" may be a human or an application process. Providing security to these diverse users, processes and applications as they migrate to a single network is a significant challenge.



ISDN security solutions must account for every imaginable type of call including voice, data, circuit-switched and packet-switched. It also must handle basic rate interface (2B+D) and primary rate interface (23B+D).

Messaging systems such as voice mail and electronic mail require separate networks and terminals. Each system provides its own security safeguards tailored for its community of users. In many cases, access is restricted to local users. If a single community of users is dispersed to several locations in a campus or field-office arrangement, they must often maintain separate systems at each location or maintain costly private leased lines between locations.

With ISDN, these two previously separate and isolated applications can be integrated and centralized. A single integrated messaging system replaces multiple voice mail and E-mail systems and also supports facsimile and video messages. This centralized system serves multiple communities of users at many locations. Since remote access is allowed on a dial-up basis, many remote users who were previously unable to access the system may also be served.

To accomplish this integration of services, more information about the calling party, called party and the nature of the call must be transported through the network. This information must be safeguarded against unauthorized users and the number and diversity of users that have access to the single system also must greatly increase. There are concerns over legitimate users of one part of the system gaining unauthorized access to other parts of the system.

ISDN developers need to demonstrate the ability to provide security services for applications that bridge multiple networks. The applications must exchange data easily across different network administrations and different vendors' equipment with no loss of functionality, no apparent distinction to the end users and no increased risk to the security of the data.

The methods of securing ISDN include centralizing ISDN application processors, and locating conference bridges and message storage and retrieval systems at a secure site that would be accessible through a secure switch. Issues involving confidentiality could be provided by the use of crypto equipment on end user devices and at the network access point of the secure switch. Data integrity should be addressed within each application. Although ISDN security is a serious problem, there are serious solutions.

Viginia Lacker is Engineering and Standards Representive at Harris DTS, Novato, Calif.

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establish a commercial regional ISDN service by 1993 suggest that an improvement in this situation will not be easy. Reportedly, the largest operators believe the EC timetable is unrealistic and do not believe that tariffs readily can be made cost-based as required by the EC plan. There also is operator resistance to the idea of providing service before identified market demand and an unwillingness to relinquish control of national numbering plans.

Despite all this, the pieces of the ISDN puzzle seem to be falling into place.

Observers such as Robert Mitro, PictureTel's vice president of sales and marketing, detect a new urgency in the marketplace. On a recent videoconferencing demonstration tour of Europe, for example, Mitro was able to get Deutsche Bundespost Telekom to run ISDN lines into a hotel in a matter of days, rather than months. "A significant transition has taken place in the last four to six months," argues Mitro. "ISDN is now ready in Europe, in our opinion."

This view is supported by the 1991 European ISDN Atlas published last month by the Ovum consultancy on behalf of the EC and in association with Fischer & Lorenz. The atlas predicts that ISDN will be available to all business users in five EC countries by the end of 1993. By 1995, it will be available throughout eight EC countries and to more than 60% of users in four other countries. Counting each primary access as equivalent to 10 basic accesses, the atlas forecasts 380,000 basic ISDN access equivalents in use in the EC by early 1994, 2.4 million by 1997 and 11.2 million by the decade's end.

> *...the largest operators believe the EC timetable is unrealistic and do not believe that tariffs readily can be made cost-based as required by the EC plan.*

Further afield the mood also is upbeat. At the recent Telecom 91 exposition in Geneva, a senior Nippon Telegraph and Telephone Corp. executive forecast that as many as 70,000 ISDN lines could be in use in Japan by 1992 and that by the year 2005, 20 million lines out of the country's 70 million will be ISDN.

Brighter Prospects

There are a number of reasons for the turnaround in the fortune of ISDN.

As Siemens' Baur points out, digital exchanges are now installed in great numbers in public networks and the ownership of personal computers is approaching the ubiquity of some types of consumer electronic products. Digital central offices and PCs are two natural elements in the ISDN chain.

ISDN terminals and terminal adapters also are appearing in greater numbers. A new example is the Digidial range of terminal adapters being launched

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later this year by U.K. data communications vendor Jaguar. The Digidial card changes a conventional PC into an ISDN workstation, combining speech and data over one or two 64-kb/s channels.

The company also will debut a Digidial modem at the upcoming U.K. Telecommunications Managers Association conference. As well as accessing 64-kb/s ISDN lines, this device can connect across the ISDN to any V.32 modem operating on the public network.

> *The success of fast packet switching systems such as frame relay will depend on the service quality and tariffs offered by service providers. . . .*

Sometimes terminal equipment manufacturers are assisted in bringing products to market by the local carrier.

Singapore Telecom, which started the world's first nationwide commercial ISDN service in 1989, has formed a partnership with the research arm of Singapore's National Computer Board and the private sector company Ssangyong Cement to develop an ISDN adapter card. It is intended to allow a PC connected to ISDN circuits to be used simultaneously for videoconferencing and multimedia transmission such as voice, data and image.

British Telecom is making facilities at its Research and Technology Laboratory available to companies to test their products for compatibility with the BT ISDN network, for interworking with other ISDN equipment, and for operability over international links. BT also is helping ISDN manufacturers gain formal U.K. network connection approval. Les Lowin, BT's ISDN marketing manager, expects the number of BT basic rate ISDN lines available in the U.K. to reach 90,000 by April 1991.

In the same way, more ISDN applications are presenting themselves. International videoconferencing is one, and the appearance of low-cost, dial-up, low-bandwidth systems is expected to fuel demand for international ISDN connections. PictureTel's Mitro believes that by 1995, low-bandwidth videoconferencing at 64 kb/s or 128 kb/s will constitute more than 90% of the market.

"That implies ISDN," argues Mitro. "Videoconferencing is the natural application for ISDN. It's the best way for the operators to exploit their infrastructure investments."

The effort already devoted to the development and standardization of narrowband ISDN, and the under-

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			Bearer services		Supplementary services				
	ISDN basic access	**ISDN primary access**	**64-kb/s unrestricted**	**3.1-kHz audio**	**Calling line identification presentation (CLIP)**	**Calling line identification restriction (CLIR)**	**Direct dialing in (DDI)**	**Multiple subscriber number (MSN)**	**Terminal portability (TP)**
Belgium	1992 (1989)	1992 (1989)	1992 (1989)	1992 (1989)	1992 (1989)	1992 (1989)	1992 (1989)	1992	1992
Denmark	1992	1992	1992	1992	1992	1992	1992	1992	1992
France	1993 (1987)	1993 (1989)	1993 (1987)	1993 (1987)	1993 (1987)	1993 (1987)	1993 (1987)	1993	1993
Germany	1993 (1989)	1993 (1989)	1993 (1989)	1993 (1989)	1993 (1989)	1993 (1989)	1993 (1989)	1993 (1989)	1993 (1989)
Greece	1993	1993	1993	1993	1993	1993	1993	1993	1993
Ireland	1993	1993	1993	1993	1993	1993	1993	1993	1993
Italy	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)
Luxembourg	1993	1993	1993	1993	1993	1993	1993	1993	1993
Netherlands	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)
Portugal	1993	1993	1993	1993	1993	1993	1993	1993	1993 (note 2)
Spain	1993 (1992)	1993 (1992)	1993 (1992)	1993 (1992)	1993 (1992)	1993 (1992)	1993 (1992)	1993 (1992)	1993 (1992)
United Kingdom BT	1993 (1991)	1993 (1987)	1993 (1991)	1993 (1991)	1993 (1991)	1993 (1991)	(note 3)	1993 (1991)	1993 (1991)
United Kingdom MCL	1992	1992 (1988)	1992	1992	1992	1992	1992	1992	1992

TABLE 1 EURO-ISDN CORE SERVICE LAUNCH DATES

Notes:

1. *The first date shown indicates the launch date for the Euro-ISDN service. Where a second date is given in brackets, that indicates the launch date for an earlier version of the service, conforming to other standards.*
2. *Terminal portability will not be available with 64-kb/s unrestricted bearer service in Portugal.*
3. *British Telecom has no immediate plans to support DDI on ISDN basic access.*

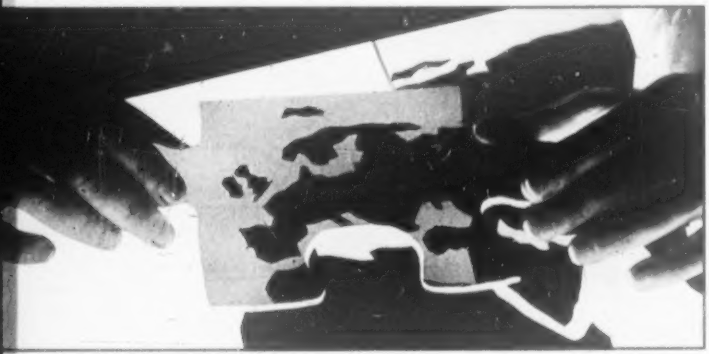
		January 1, 1991	January 1, 1994	January 1, 1997	January 1, 2000
Belgium	Primary		1	6	12
	Basic	1	1	35	167
Denmark	Primary		1	3	7
	Basic		2	60	195
France	Primary	1	5	18	66
	Basic	5	36	248	1706
Germany	Primary	1	5	21	83
	Basic	8	48	332	2318
Greece	Primary			1	8
	Basic			4	59
Ireland	Primary			1	3
	Basic			4	37
Italy	Primary		1	17	36
	Basic		3	136	1209
Luxembourg	Primary				1
	Basic			2	9
Netherlands	Primary		1	5	12
	Basic		2	70	347
Portugal	Primary			3	10
	Basic		1	13	110
Spain	Primary		1	16	34
	Basic		3	113	497
UK	Primary	2	12	32	88
	Basic		24	154	979
EC total	Primary	3	26	123	360
	Basic	15	120	1171	7632

TABLE 2 PROJECTION OF ISDN ACCESS USAGE (THOUSANDS)

All figures are rounded to the nearest 1000. A blank indicates a projection of fewer than 500.
The projections include both national standard and Euro-ISDN.

lying momentum achieved by the technology, also are factors favoring market uptake. "ISDN is the only standardized technology today for digital communications," points out Baur. "We cannot supply digital systems in Europe, the U.S. or Japan that do not have ISDN capability."

Finally, the ISDN educational effort is picking up speed. As well as increasing public awareness through national and international user forums, operators and manufacturers are participating in an increasing number of service and hardware demonstrations worldwide.



In one demonstration in mid-October, the *Daily Telegraph*, the U.K.'s most widely read broadsheet newspaper, remotely-made up full color pages over an international 384-kb/s ISDN link between London and Amsterdam. This demonstration used the System 2000 ISDN multiplexer, developed by the Australia company Datacraft, to aggregate six 64-kb/s channels.

The previous week at Telecom 91 in Geneva, ISDN products were exhibited in more than 60 booths, and most of the 70 different terminal adapters currently being sold in Europe were on display.

A major effort was made by Japanese companies at Telecom. NTT, for example, demonstrated an ISDN supervisory and testing module; an ISDN remote terminal; and terminal equipment such as videophones, a multipoint videoconference system, color and Group IV facsimile transceivers, and digital telephones.

Videophones, digital telephones and Group IV facsimile machines from 18 Japanese manufacturers also were interconnected through NTT's ISDN interface subscriber module. And, while some of these were only technology demonstrations, other products showcased already are on sale in Japan.

ISDN Down the Road

But what about the future? At present, both demonstrations and working use of narrowband ISDN tend to concern rather straightforward applications such as file transfer from PC to PC, videoconferencing, Group IV facsimile exchange, high-quality sound and access to databases.

"Today, the major applications that represent the

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range of most client needs and, in practice, the most widespread usage, are relatively simple applications from a technical viewpoint and can be provided at low cost," argued Francoise Ravel, head of the switching and new telephony services department at the international networks division of France Telecom, at Telecom 91. "In other words, they require little specific hardware or software development and use, where possible, standard or commonly-used compatible terminals."

But more complex applications already exist or in the pipeline. In France, such applications often result from collaboration between France Telecom, end users and specialist software houses.

"The partnership approach has shown that services as diverse as remote access to documents, remote medical diagnosis from echographic images or remote video supervision can be widely used in the relevant professional environments," said Ravel.

For such applications to be developed on an international basis, a number of outstanding equipment compatibility and interfacing issues must be settled, he warned.

While they are being settled, competitors for some of the "natural" narrowband ISDN market constituency are appearing on the horizon. As previously noted, present day bandwidth-on-demand is one, and future fast packet switching and broadband ISDN are others.

In fact, dial-up, pay-by-use services involving aggregates of multiple 64-kb/s channels already are available with narrowband ISDN. In addition to the Australian technology used in the *Daily Telegraph* demonstration, a subsidiary of Swedish Telecom has developed an ISDN terminal that combines and synchronizes several 64-kb/s channels to form higher order channels at, for example, 384 kb/s or 2 Mb/s. In Sweden, such terminals are connected to a service called IDN 340,000.

The success of fast packet switching systems such as frame relay will depend on the service quality and tariffs offered by service providers, although it is possible to view frame relay as a starting point on the way to true broadband ISDN using technology such as asynchronous transfer mode (ATM) switching.

ATM also was much in evidence at Telecom 91, where demonstrations included a joint presentation from Ericsson and IBM.

All major league international telecom players have ATM prototypes, pre-commercial implementations or plans for the technology. Fujitsu, which already has an ATM product portfolio, recently tested a module with a switching capacity of 40 Gb/s and is developing even faster technology.

Alcatel, whose switches established France Telecom's pioneering Numeris ISDN service, is planning a return to the U.S. CO market—currently the world's biggest user of narrowband ISDN—via ATM technology.

The company has begun discussing its plans with major local exchange carriers in the United States and expects to stage a full ATM trial in 1992, according to Larry Hulbert, vice president-sales, service and technical marketing for Alcatel Network Systems.

"We expect the U.S. market will be ready for full deployment of ATM to begin in 1994 or 1995," says Hulbert. "We would expect to deploy a significant amount of ATM [switches] by then."

A common aspiration of vendors is to assemble a portfolio of technology and systems capable of matching present market demands and having the evolutionary potential to meet future requirements.

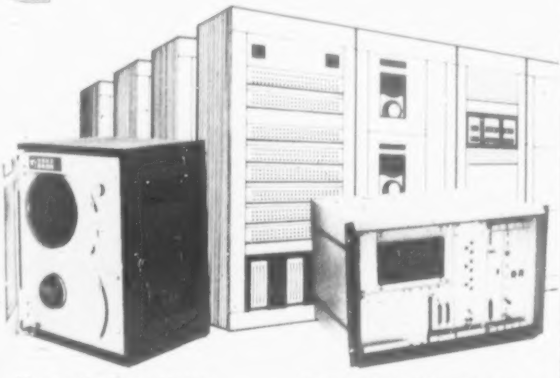
Vision O.N.E. is the Siemens/GPT way to hedge this particular bet. "The multinationals are going to drive ISDN. Whether it's narrowband or broadband is hard to say," suggests Tony Cobbe, group marketing director of GPT's telecommunications systems group.

Set against the "too little, too late" interpretation of narrowband ISDN are a number of unresolved issues for its would-be broadband successor. As yet there is no evidence that widespread terminal availability, application development or international interconnection and standardization will be easier to achieve for broadband ISDN than was the case with narrowband.

Broadband tariffs, too, present something of a conundrum: The technology offers channel capacities several thousand times larger than today's systems, but obviously no one will accept price hikes of the same magnitude for using ATM networks.

Finally, there is a distinct possibility that high- and low-rate systems will co-exist. As Baur puts it: "We cannot assume that broadband ISDN will replace ISDN—rather that it will supplement it." ■

INNOVATIVE DATA TECHNOLOGY
THE INTERNATIONAL STANDARD FOR DATA INTERCHANGE



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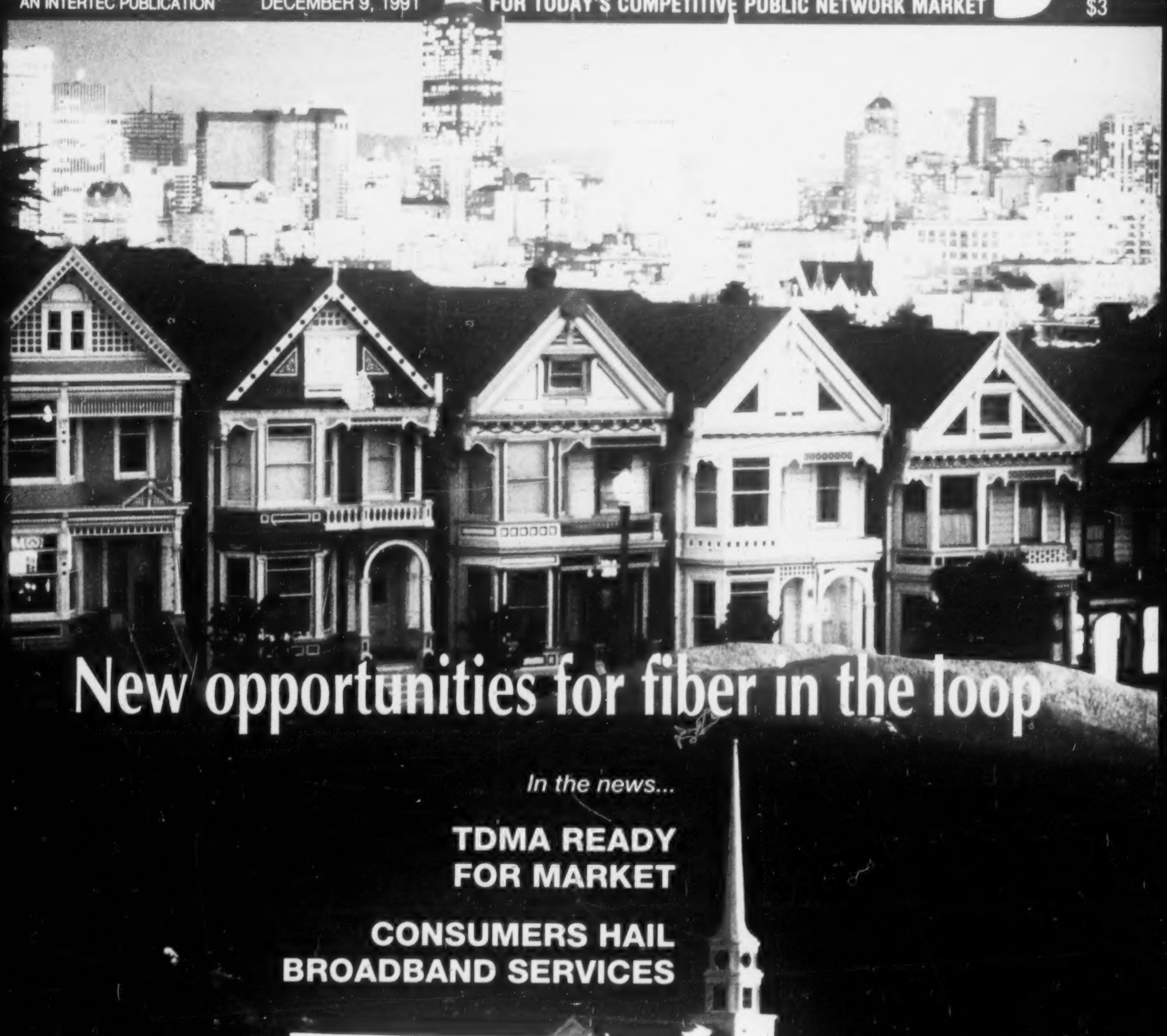

New opportunities for fiber in the loop

In the news...

TDMA READY FOR MARKET

CONSUMERS HAIL BROADBAND SERVICES

MONDAY, DECEMBER 9, 1991 Volume 221, No. 24

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

Rural areas and densely populated urban areas may have something in common in the telecom realm. LECs may be able to prove-in fiber in both areas now, to reduce their costs of providing needed services. Cover photography by Jake Rajs and A. Satterwhite, The Image Bank

NEWS OF THE WEEK

8 **TDMA IS 'READY TO GO'**
Final testing of the cellular technology is complete; commercial deployment could come as early as next year

8 **CONSUMER BROADBAND GETS THUMBS UP**
A survey sponsored by Northern Telecom and BellSouth shows an emerging market for residential multimedia information services

9 **BELLCORE TO BOOST SS7**
Improvements to the signaling technology would help avoid the service outages that plagued the industry last summer

10 **AMERITECH TESTS AIN**
American Drug Stores and Continental Bank participate in the first external trial of Advanced Intelligent Network technology

14 **MICROTAC LITE STUMBLES IN JAPAN**
The intricacies of the Japanese market are inhibiting sales of the lightweight portable phone

FEATURES

23 **FAST DATA ON FIBER**
By David Krozier. Public carriers have managed to attract business voice traffic back to the public network. They also can attract data customers, if they design a transport network for the future

32 **NEW OPPORTUNITIES FOR FIBER IN THE LOOP**
By Bill Counts. The need to reduce costs of service in rural areas and densely populated urban areas may drive the use of fiber now

40 **THE FUTURE OF THE LOCAL LOOP**
By Scott L. Horn. Telcos need technology that can overcome the restrictions of their current networks and provide a platform for new services. A solution that does both—a switched digital FITL system—is available today

43 **BILLING SYSTEM HELPS GOLDNET HIT PAY DIRT**
By Brenda Graham. This president of a telecom management company proves by her results that creatively providing customers with telecom solutions brings success

60 **PERSPECTIVES**
By Carol Wilson. Who will offer personalized communications services? Today's cellular carriers may be the first up and running

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NEWS OF THE WEEK

Cellular carriers complete final tests, declare TDMA 'ready to go'

Charles Mason, Washington Editor

The cellular industry took a major step toward digital technology with the announcement last week of the successful final tests of time division multiple access (TDMA) technology. The move clears the way for the possible commercial deployment of TDMA as early as next year.

The cellular industry has been attempting to develop a common technology for the transition to digital, which promises far greater capacity and improved voice quality and security over current analog transmission.

"We're ready to go and on target," said Wayne Perry, vice chairman of McCaw Cellular Communications.

The announcement of the successful "lockdown" of TDMA and Perry's remarks were made during a two-day conference held in Arlington, Va., last week by the Cellular Telecommunications Industry Association to discuss the results of TDMA and other trials.

The switch vendors successful in the TDMA tests are AT&T, Ericsson and Northern Telecom, CTIA reported. Companies providing successful end user equipment are Ericsson/GE, Hughes Network Systems, Mitsubishi, Motorola, Oki Telecom and Sony.

"I would characterize the whole process as a tremendous success," said Michael Hirsch, CTIA's vice president for technology, at the conference.

Reporting on the TDMA trials, Ken Corcoran, director of planning for Southwestern Bell Mobile Systems, said tests in Dallas showed that most

Survey shows broadband-to-home market

Richard Karpinski, Assistant Editor

Home entertainment may be the hook that catches public interest in telco-provided broadband information services, but that shouldn't rule out the success of other niche services such as video shopping, electronic classrooms and multimedia libraries, according to a market study released last week.

The study, a survey of more than 800 consumers in six cities, was sponsored by Northern Telecom and BellSouth. Field work was done by P G Research, formerly known as Noel Dunivant and Associates.

For purposes of the survey, BellSouth was portrayed as a gateway operator offering various video-based information services. Respondents were shown simulations of the services and asked to rate them.

Movies-on-demand and past TV (downloading previously broadcast TV shows) were among the big winners; home shopping brought up the rear (see chart). Overall, about 70% of the respondents said they would be willing to pay for some of the new services.

"Entertainment was the big winner," said Denise Townsend, operations manager-service concepts, research and analysis at BellSouth. "But clearly there are other services that would be served by broadband technology that would be very viable for the home."

BellSouth has long been a vocal proponent of moving fiber optics and related broadband services to the home. The company will use the survey results to help develop the business case and network strategy needed to support residential broadband, Townsend said.

Other survey findings may help guide the Bell regional holding company's plans: A TV-based rather than PC-based system appeared to hold the broadest appeal. Younger respondents were most attracted to the services overall. BellSouth believes certain services, such as video shopping, could be adequately rolled out today at T-1, or sub-T-1 rates.

This last point may be key. With copper-based wideband technologies such as asymmetric digital subscriber line (ADSL) coming into focus, the industry could envision as an evolutionary step an ADSL-based gateway service that would offer most multimedia services, said Mark Lee, manager multimedia marketing for Northern Telecom.

Northern Telecom has talked to potential service providers, Lee said. "They tell us they'd like to see a critical mass of people connected to a service before they'd commit to it. ADSL could rapidly accelerate the development of that critical mass," he stated.

The survey results also could affect public policy. The results seem to support the telco position that, if the consumer broadband market is to really take off, telcos must be free to play a leading role, Townsend said.

Northern Telecom has stressed the need to educate consumers on the potential of the public network, with the idea that enlightened consumers would in turn support needed public policy changes. At SUPERCOMM '91, the company talked about leading a nationwide public awareness campaign in conjunction with the RHCs and the U.S. Telephone Association *(Telephony, March 25, page 8).*

CONSUMERS RATING SERVICE CONCEPTS 'EXTREMELY APPEALING'

Service	Percent of respondents
Entertainment	
Movies	33.1%
Past TV	23.2%
Interactive news	20.4%
Music	26.0%
Shopping	
Grocery shopping	20.9%
Catalog shopping	14.6%
Window shopping	5.1%
Educational	
Electronic classroom	24.8%
Multimedia library	22.1%
Point-to-point	
Video telephone	22.4%

Source: Northern Telecom/BellSouth Services

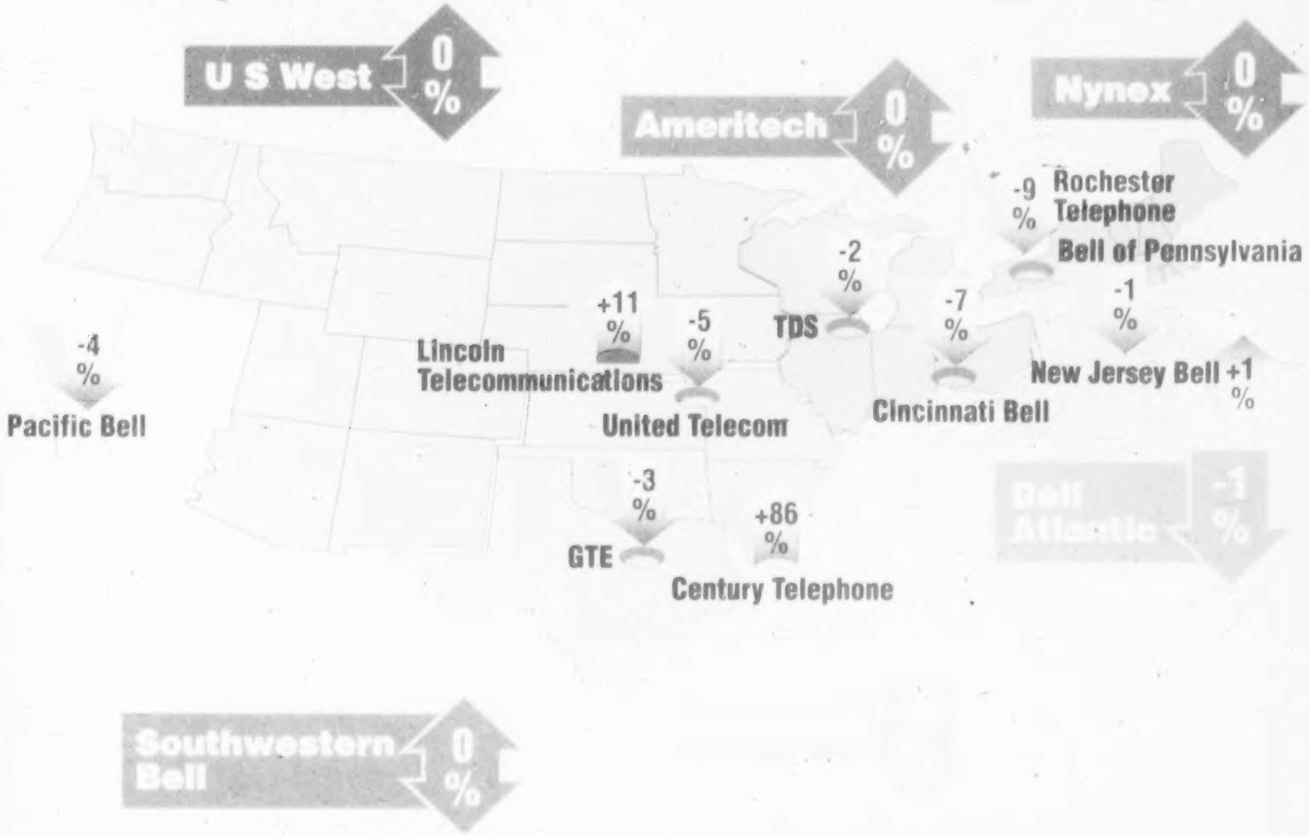
Telephony

AN INTERTEC PUBLICATION DECEMBER 16,1991 FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET $3

Annual Domestic Review & Forecast Issue

An uncertain future for the LECs

Rating the RHCs


U S West 0 %
Ameritech 0 %
Nynex 0 %
-9 % Rochester Telephone
Bell of Pennsylvania
-2 % TDS
-7 % Cincinnati Bell
-1 % New Jersey Bell
+1 %
+11 % Lincoln Telecommunications
-5 % United Telecom
-4 % Pacific Bell
-3 % GTE
+86 % Century Telephone
Bell Atlantic -1 %
Southwestern Bell 0 %

N.J. BELL, CATV FIRM SPAR

GTE's JOHNSON TO RETIRE

MONDAY, DECEMBER 16, 1991 Volume 221, No. 25

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

All across the country, 1991's recession and regulatory and technological barriers resulted in sagging capital expenditures by many local exchange carriers. And industry watchers don't expect an upturn until 1993. Cover computer illustration by Holly Seguine

NEWS OF THE WEEK

8 **N.J. BELL, CATV FIRM SPAR**
New Jersey Bell charges that Suburban Cablevision Inc. delayed airing a TV ad outlining the telco's infrastructure development plan until the cable TV operator could create its own response

8 **GTE'S JOHNSON STEPS DOWN**
Charles Lee, GTE's president and COO, will succeed James "Rocky" Johnson, chairman and CEO, when he retires in May after three years at the helm of the nation's largest Independent telco

9 **SPECTRUM TOPS PCS DEBATE**
The battle for spectrum continues to be standing in the way of the personal communication services frontier

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Newbridge Networks Inc. discloses a variety of joint ventures primarily involving construction of digital networks

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By Steven Titch. A new study on the RHCs reports that quality doesn't necessarily coincide with cost. The Mercer Scorecard instead cites correlations between quality and traditional performance measures, sparking some vigorous responses

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By Steven Titch. America's business legacies and ideas about telecommunications are adversely affecting the industry today

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Domestic review and forecast

An uncertain future for LECs

CAROL WILSON, Editor

The numbers don't lie, and for the second straight year, they indicate little or no growth in capital spending by U.S. local exchange carriers.

The 1991 *Telephony* review and forecast shows spending during the past year fell almost 2% among the Bell regional holding companies, while spending among top Independents fell 3%. The same research shows only a slightly brighter picture for 1992, when RHC spending is expected to grow 3.5% and Independents are expected to contract another 4% (see chart on page 18).

This is one picture, though, that is impossible to paint by the numbers alone.

Industry analysts agree that key factors—including the recession, and regulatory and technological uncertainties—have combined to hold back LEC spending on equipment, capitalized labor, wire and cable, vehicles, computers and other capital items. There is also general agreement that no movement in any one area, such as a lifting of federal restrictions

on telephone company ownership of cable TV companies, for example, will trigger major spending increases in the coming year.

The analysts see definite signs, however, of renewed spending beginning in 1993 and of major spending growth in the middle decade years, as LECs move to deploy new technology and tap new markets.

"The LECs are battening down the hatches for an extended period of lackluster performance," says Peter Bernstein, analyst with Probe Research, Cedar Knolls, N.J. "I can't fault them for being conservative, given current economic conditions. This may be the most difficult year to access the meaning of their construction budgets."

"The RHCs must have a more comfortable environment in which to spend," says Steve Sazegari, telecommunications analyst with Dataquest, San Jose, Calif. "Right now there are many uncertainties in the regulatory arena, in the standards arena and in the technology arena. For the RHCs to overcome this will take time. Setting aside the economy for a moment, I think we see some movement toward more expenditures in the 1994-95 time frame, especially with standards and regulatory problems clearing up."

Feeling the Pinch

The most obvious cause of the current conservatism among the LECs is the state of the nation's economy, which is driving down growth in access lines and demand for new business services. According to the U.S. Telephone Association, the number of access lines grew less than 3% in 1990.

"Traffic growth is slowing, so, as any company would do, the LECs are pulling in a little bit," says Paris Burstyn, analyst with Business Research Group, Newton, Mass. "The new technologies aren't deployed as rapidly, but at the same time the demand doesn't grow as rapidly for high-bandwidth services. The customer side is also growing more slowly."

Because planning is done two years out, LEC spending budgets actually have been somewhat insu-

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Local Exchange Carriers' Network Expansion Budgets ($000,000)

	1989	1990	1991	1992
7 Regionals				
Ameritech	1,862.1	1,927.0	1,930.0	2,088.0
Bell Atlantic	2,461.3	2,352.0	2,331.0	[a]2,447.6
BellSouth	3,015.5	2,888.8	2,727.0	2,794.6
Nynex	2,095.0	2,300.0	2,300.0	2,300.0
Pacific Telesis	1,491.0	1,760.0	1,690.0	[b]1,830.0
Southwestern Bell	1,290.0	1,506.0	1,501.0	1,433.0
U S West	1,800.0	2,000.0	2,000.0	2,100.0
Top Independents				
GTE[c]	2,798.0	2,955.0	2,864.0	2,602.0
United Telecom	660.0	653.0	621.0	637.0
SNET	356.7	345.0	300.0	300.0
Centel	187.3	225.7	[d]170.0	[d]200.0
Alltel	184.0	203.0	210.0	230.0
Puerto Rico Telephone	186.0	199.6	205.5	210.0
Cincinnati Bell	142.2	126.5	117.0	113.0
Rochester Telephone	66.2	61.0	55.7	52.7
C-TEC	36.1	40.9	44.6	34.7
TDS	54.6	66.0	65.0	69.0
Lincoln Telecommunications	29.9	30.8	34.1	34.0
Anchorage Telephone	8.8	12.9	16.7	21.2
Century	54.0	59.0	110.0	111.0
Consolidated Network	NA	NA	11.0	12.0
LEC Composite				
Regionals	14,014.9	14,733.8	14,479.0	14,993.2
Independents	4,763.8	4,978.4	4,824.6	4,626.6
Total	18,778.7	19,712.2	19,303.6	19,619.8

[a] Bell Atlantic 1992 figure projected at 5% growth
[b] Pacific Telesis 1991 and 1992 figures do not include Nevada Bell
[c] GTE figures include Contel due to merger
[d] Centel 1991 and 1992 figures do not include Central Telephone Cos. of Iowa and Minnesota

lated from recessionary effects, says Fritz Ringling, analyst with Insight Research Corp., New York.

"There is a lag between the economy and their investments," he says. "Companies commit to making certain investments. I suspect what will happen in 1992 is that they will pare down their budgets from their overspending in 1990 and 1991. I would expect 1992-93 [spending] to be flat to down."

There also is pressure from Wall Street for LECs to trim costs, as many have done so by cutting people and keeping equipment budgets tight. Between 1990 and 1991, the local telephone industry cut more than 20,000 jobs, or 3% of its personnel total.

"The RHCs in particular worry a lot about their stock prices," says Bernstein. "There are a couple of ways of making your bottom line look good in a downturn, and one is not to spend money."

There is concern, however, that early retirement programs and other job cuts are "eliminating too many experienced craftspeople," says Bernstein. "One of the things being said about AT&T in the wake of its outage problems is that it may have gotten rid of too many experienced people."

Where to Invest

Despite the gloomy economic news, analysts agree that large LECs, particularly the RHCs, are still relatively well-heeled. But the combination of slow access-line growth and regulatory restrictions on earnings creates a disincentive for the RHCs to invest their money in upgrading their local telephone networks. Increasingly, they are looking overseas, where they can earn a higher return on investment.

"The telcos have realized that there are limitations to what they can earn in their own operating territories and have put much more money into ventures that don't have an impact here in the U.S., like foreign cable and cellular systems," says Ringling. "They have invested progressively in new privatization, and that will be a continuing trend in 1992."

Such investments represent higher risks, but also much greater rewards, he adds. "Telcos are expecting a higher return from those investments than the 11% to 12% they can earn on their local network operations in the U.S."

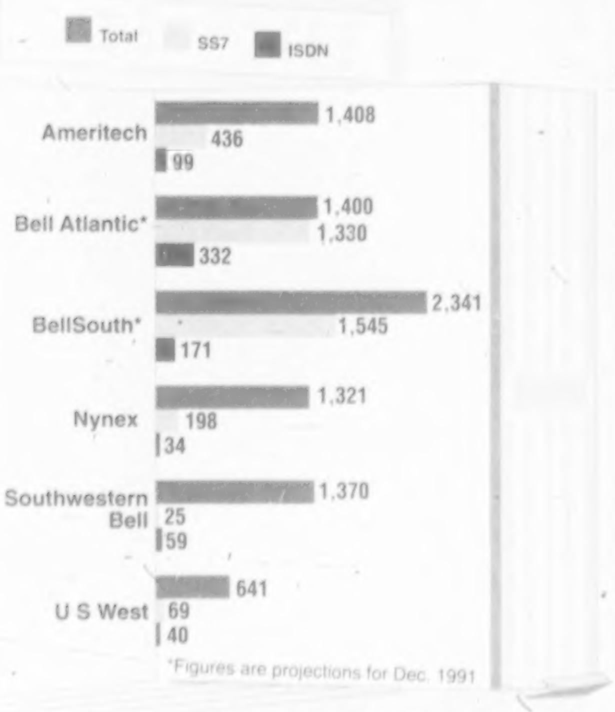
Although the RHCs insist that their investments overseas do not drain cash from U.S. network modernization plans, there is, in fact, one pool of investment money, says Sazegari. "Their investments overseas do create a scenario for cash drain," he says.

The LECs have had considerable success in recent years in lobbying state regulators for incentive rate plans that, at minimum, allow them to keep part of the profits earned beyond the traditional rate-of-return limits. Incentive regulatory plans are in place in many states, either on a trial or limited-run basis, and theoretically pave the way for LECs to realize a greater return on their investment dollar.

"The success of these plans has been less than the market anticipated, however," says James Stork, analyst with Duff and Phelps, Chicago. Often this is because LECs have had to "buy into" such plans by offering rate cuts up-front, and those costs and the depressed economy have held down profit growth, he adds.

RHC CO facilities—Host and remote

(As of June 1991)



*Figures are projections for Dec. 1991

Note: Pacific Telesis information unavailable

"Hopefully, companies will start earning at the incentive level. But if it's a three-year or four-year plan, the question is when will they earn at the level where they share excess profits with ratepayers?" asks Stork. "And if they are able to push returns up in the final year of an incentive rate plan, then will regulators say, 'OK, now let's cut your rates another 10% and start over?' It isn't clear yet whether these plans provide long-term incentives for telco investment. There are still too many unknowns."

It is no exaggeration to say that the entire local exchange picture could be characterized as a great unknown. Tremendous technological change beckons in the form of intelligent broadband networks, offering ubiquitous high-speed voice, data and image transmission, a host of new revenue-producing services, including personalized communications services, that will revolutionize communications.

But it is not at all clear how LECs will evolve their networks, since standards for these technologies, which include the synchronous optical network, asynchronous transfer mode switching, the Advanced Intelligent Network and new operations support systems (OSSs), are not complete. The OSS standards, in particular, lag behind since they must be adapted with each new technological advance.

Because choices made today will have an impact well into the future, the LECs are cautious in their

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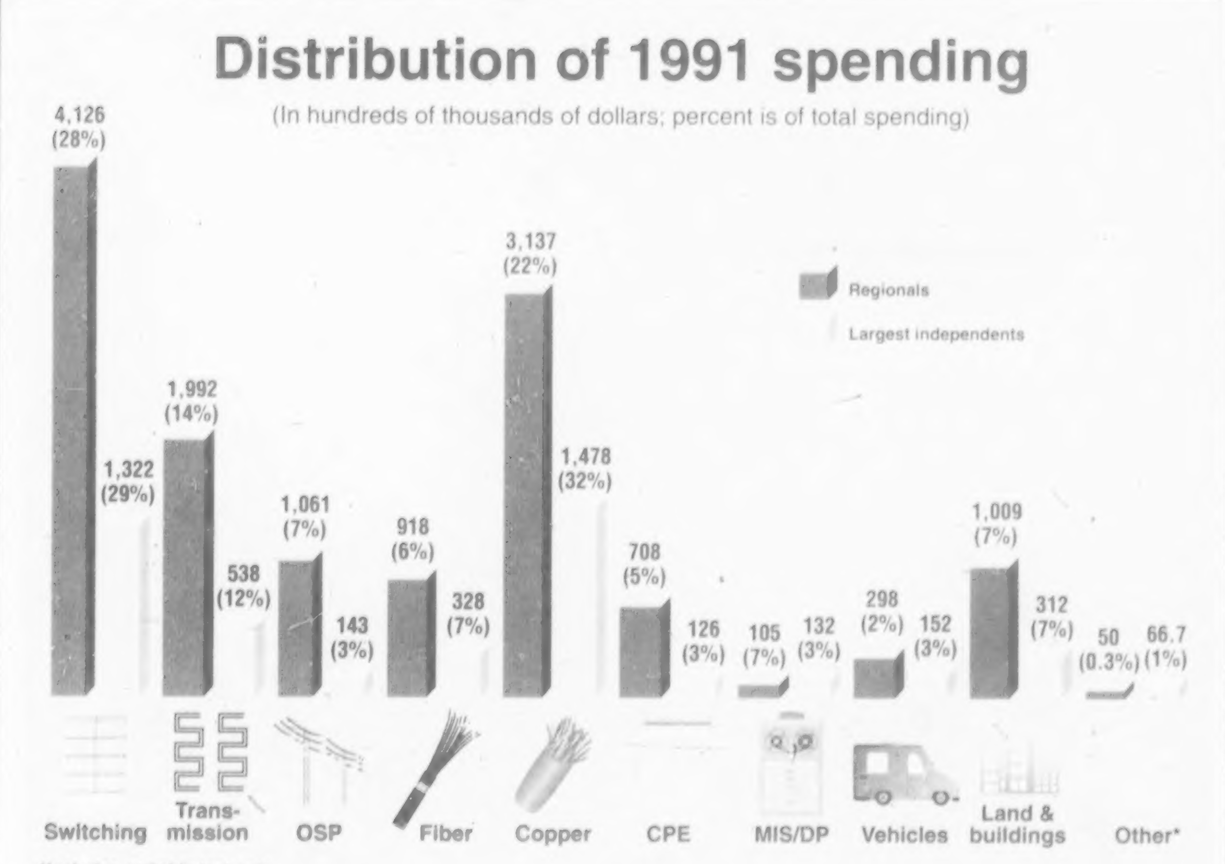

Distribution of 1991 spending

(In hundreds of thousands of dollars; percent is of total spending)

*Includes portable test sets

Review and Forecast *continued*

approach. For example, there is general agreement that SONET is the future of public network transmission. Until SONET standards are finalized, however, OSSs have been equipped to handle SONET messages. Because it is still unclear how SONET will coexist with asynchronous equipment in the transition phase, many LECs are being conservative with their equipment deployment.

"New technologies are not having the impact that they should because the standards have not been put into place," says Ringling. "It is going to take another five years or longer before everyone agrees on everything. Telcos are holding back—they'll deploy new systems selectively where major customers want it—but they are nervous and rightly so. They could be stuck with equipment that is obsolete."

Local loop competition is the one great unknown that could have an immediate, major impact on LEC spending, the analysts agree.

"The LECs are facing critical choices about their broadband platform," adds Sazegari. "They must buy a platform they can expand into the future with a minimum level of investment. Although certain vendors have certain solutions, they are offering different options, and the RHCs must look at those options.

"What we are in now is an elongated trial period," Sazegari continues. "We see two different internal forces within the telco that are at odds. One is network planning, which wants to put some of the new stuff in place right away—they are more aggressive and excited. The other is operations, and the operational people want to see a solid OSS solution. Although Bellcore has done a lot of work in this area, the level of standardization has not been solidified for the OSS. So new technologies, even if they are acquired, often operate in isolation."

The RHCs are moving to offer new data communications services, particularly for local area network interconnection, but here there are also technological uncertainties and market questions. Large corporate users are feeling the recessionary pinch and also are uncertain about new technologies, says George Newman, analyst with IDC, Framingham, Mass.

"This seems to be a period of market adjustment

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midstream," says Newman. LECs are figuring out what kinds of data services they can offer, whether it's frame relay or switched multimegabit data service, and how they can bundle the services, he says.

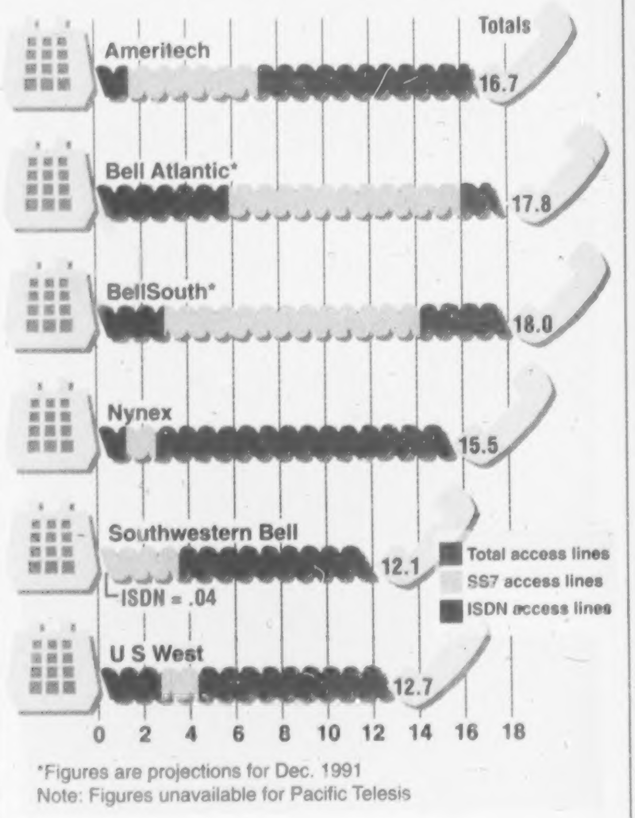
"They know they need to build the infrastructure of the future," Newman says, "but we're not there yet. There are a lot of internal management decisions to be made as to the future direction. They want to play in this potentially explosive market, but that could entail a sizable investment. I suspect some will be more aggressive than others."

LECs are looking to the market for direction, Newman says, but are finding users with confusion of their own. "Companies are retracting a bit and examining what is most fruitful—a private solution or the public carriers," he says. "Everyone is kind of stymied and looking at each other for direction."

In addition, the LECs—particularly the RHCs—are not at all certain what role they will be allowed to play in offering services such as video entertainment to the home that could provide the financial incentive for major technology deployment. Such decisions lie in the hands of a politically fickle Congress, which would have to reverse the 1984 Cable Act prohibiting cable/telco cross-ownership, and the Federal Communications Commission, which will determine spectrum allocation for personal communication services that could determine competitive boundaries. Congress also may act on lifting all or some of the Modified Final Judgment restrictions on the RHCs, which would allow them into long-distance service and manufacturing. Or it may put new restrictions on the RHCs' newly granted ability to provide information services content.

Total RHC access lines

(In millions as of June 1991)

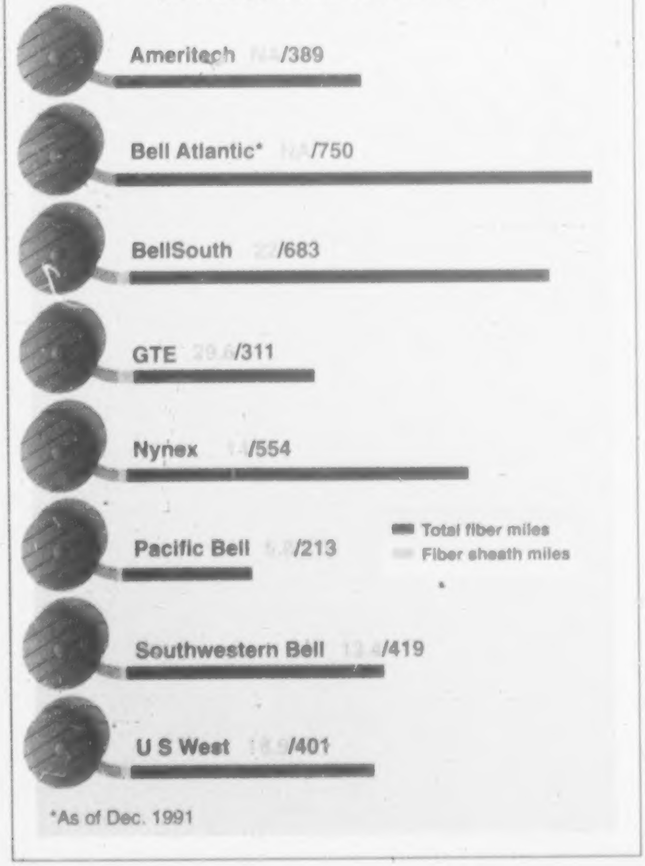


*Figures are projections for Dec. 1991

Note: Figures unavailable for Pacific Telesis

1991 RHC fiber sheath miles vs. total fiber miles

(In thousands as of June 1991)



*As of Dec. 1991

On the state level, there is ongoing uncertainty as to the extent that LECs will continue to gain pricing freedoms and improve depreciation schedules that will allow them to write off old equipment more rapidly. There is also the major issue of competition and how it will be structured.

The Wild Card

Local loop competition is the one great unknown that could have an immediate, major impact on LEC spending, the analysts agree. Such competition, in the form of competitive access providers (CAPs), could force LECs to move quickly to modernize their networks, at least where they are under competitive pressure. The two largest alternative carriers, Metropolitan Fiber Systems and Teleport, are deploying fiber rings in major urban areas and, in

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some instances, offering new technologies more rapidly than LECs. Teleport is operating a SONET-based network in Chicago, for example, while MFS is offering high-capacity broadband services in Houston.

CAPs also are pushing for interconnection to the public network, and there are indications that regulators in some areas are prepared to open the door to full competition, following the lead of Illinois Commerce Commission Chairman Terrence Barnich *(Telephony, Dec. 2, page 8).*

"The LECs are concerned about competition, but that concern isn't reflected in their capital budgets," says Ringling. "If, for example, competition had a major impact on Illinois Bell revenues, they would rethink their investment strategy and pour substantial investment into the urban and suburban systems, especially into transmission and fiber systems. There could be a quick turnaround, if the LECs felt they needed to do that."

There is some danger, however, if the LECs wait too long to respond to competitors, particularly in markets such as data communications, where demand is building rapidly.

"The real question is what is the time frame for them to respond to competition?" comments Bernstein. "Is it now, is it next year, or is it when they get competition taking 15% of their business? This cuts to the heart of their mind-set and their culture—how fast can they turn the ship?"

"If [the LECs] want to be perceived as nimble providers of modern data communications services, they have to be ready to move and to prove they are a little more flexible," adds Newman. "They really need to reinvent themselves for users."

The Bright Side

For all of the uncertainty, however, the U.S. telecommunications market remains healthier than what concerns over the LECs' future spending might lead one to conclude. Even with little growth this year, the market totals—$19.3 billion—are impressive. And closer examination shows comparisons with past spending are more favorable than hard numbers indicate.

"It's still a huge market," says Burstyn. "People lose sight of the fact that 40% of the world's market is here. Regular maintenance and upkeep alone provide a solid base of investment for manufacturers."

In addition, says Salomon Brothers' Michel Guite, today's investment dollars buy more equipment and less capitalized labor than in the past.

"Because telephone companies commingle equipment spending with labor costs for installation and maintenance, capital budgets may be down as equipment buying increases," he says. "In addition, a much higher percentage of investment today is in software, and the LECs often consider software as an expense item, not a capital budget item."

As a result, says Stork, increased software expenses show up in the "right to use" fees reported in quarterly earnings, not in capital budgets.

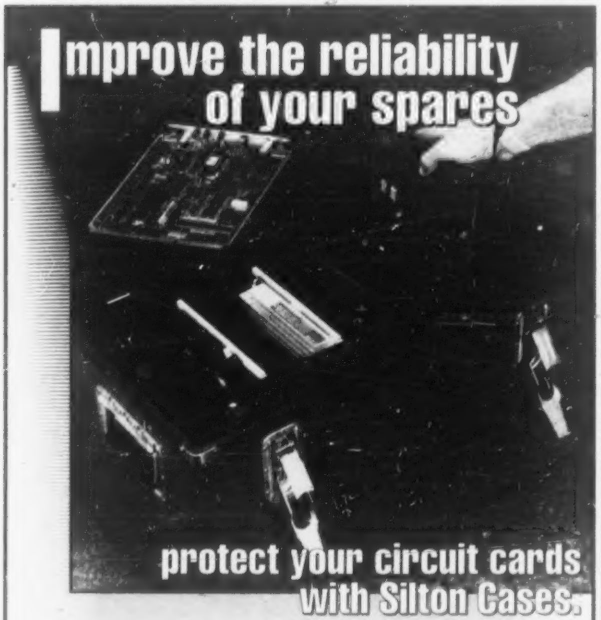
There is ample evidence that LECs are getting more bang for their equipment buck as a combination of technology improvements and competitive pressure drives down the cost of most equipment.

"Telecommunications equipment manufacturers are participating in an extraordinarily powerful market that has momentum, breadth and depth," says Guite. That is why the telecom equipment sector has outperformed home markets on a global basis and Standard & Poor's 500 in the U.S., he maintains.

While other analysts don't completely share Guite's optimism, they generally agree that LEC spending will take a definite upturn toward the middle of the decade, beginning either in 1993 or 1994, depending on whether telcos are allowed into markets such as CATV and whether competition becomes a real threat in major markets.

The real challenge for the LECs is to avoid being paralyzed by the current market uncertainty, so that strategic planning doesn't become merely reactive. Instead, they should position themselves to capitalize on technological and political change, while protecting their current bottom line.

"What the LECs need is an articulation of a vision of where they want their networks to be five years from now, 10 years from now and so forth, and what the service agenda is that will go over their lines," says Bernstein. "Based on that, they can make judgments relative to their construction budgets and determine whether they are spending enough. Without a vision of where they want to go and how they want to get there, it is impossible to analyze what they are doing today." ■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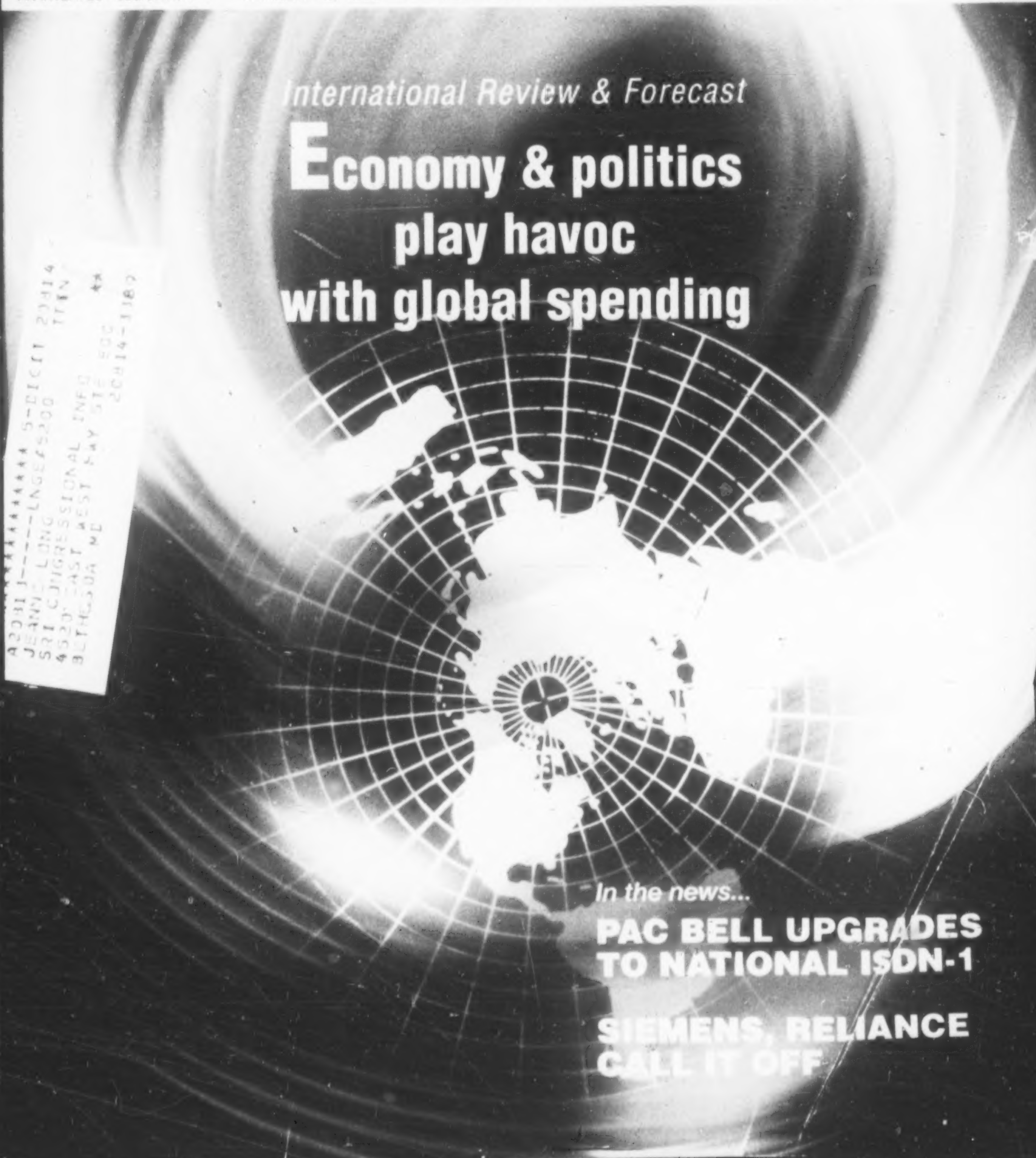

International Review & Forecast

Economy & politics play havoc with global spending

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In the news...

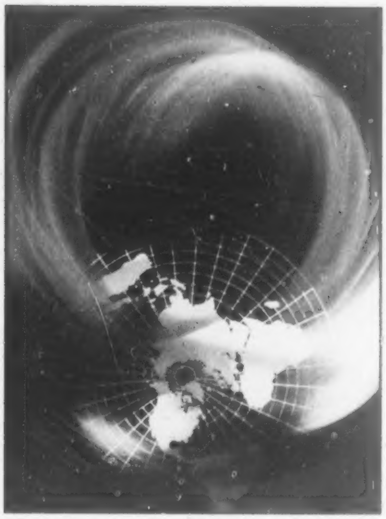
PAC BELL UPGRADES TO NATIONAL ISDN-1

SIEMENS, RELIANCE CALL IT OFF

MONDAY, JANUARY 6, 1992 Volume 222, No. 1

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET



Overall spending by telcos has been swept downward due to the poor economy and uncertain political conditions around the world. Cellular providers, however, have largely escaped the storm. Cover artwork by Dominique Sarraute, The Image Bank

NEWS OF THE WEEK

8 **PAC BELL UPGRADES TO NATIONAL ISDN-1**
Over the next six years, the California LEC will outfit 112 of its DMS-100s with National ISDN-1 upgrade modules

8 **SIEMENS, RELIANCE SPLIT UP**
Reliance objected to new conditions that the German conglomerate brought into acquisition discussions

9 **PCS PRESENTS A REGULATORY HEADACHE**
Among the issues are how much spectrum will be allocated, where it will come from, what restrictions will be placed on entrants and exactly who those entrants will be

10 **AMERITECH LAUNCHES ONA**
The Midwest RHC will be the first to offer services under Open Network Architecture

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By Carol Wilson. A worldwide recession has affected the demand for telecommunications and has led some telcos to re-evaluate their telecom spending plans, according to *Telephony's* annual International Review and Forecast

40 **PERSPECTIVES**
By Carol Wilson. A study of the careers of retiring telecom leaders Rocky Johnson of GTE and William McGowan of MCI offers a picture of history from two perspectives

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Pacific Bell to upgrade 112 COs to National ISDN-1 standard

Richard Karpinski, Assistant Editor

Pacific Bell announced last week a major upgrade of most of its Northern Telecom DMS-100 switch base to the National ISDN-1 standard, beginning in late 1992.

Over the next six years, Pacific Bell will outfit 112 of its approximately 135 DMS-100s with National ISDN-1 upgrade modules. That will make standards-based integrated services digital network offerings available to about 2.5 million customers, or 15% of Pacific Bell's access lines, according to Wayne Purves, Pacific Bell product manager-ISDN.

Pacific Bell has not yet decided where it will deploy the upgrades, Purves said. However, customer demand for ISDN services should be the guiding force, he said. Pacific Bell sees the market for ISDN cutting across all market segments, including large- and small-business users and even residential customers, he added.

Pacific Bell also is negotiating with AT&T to upgrade its embedded 5ESS switches to National ISDN-1. The company hopes to have a deal signed with AT&T by the end of the first quarter, Purves said.

The National ISDN-1 standard, created by Bellcore and widely backed by industry carriers, switch makers and customer premises equipment vendors, promises to cure the problems associated with proprietary versions of ISDN. Problems such as service islands and a lack of terminal portability are generally acknowledged to have ground the progress of ISDN to almost a halt.

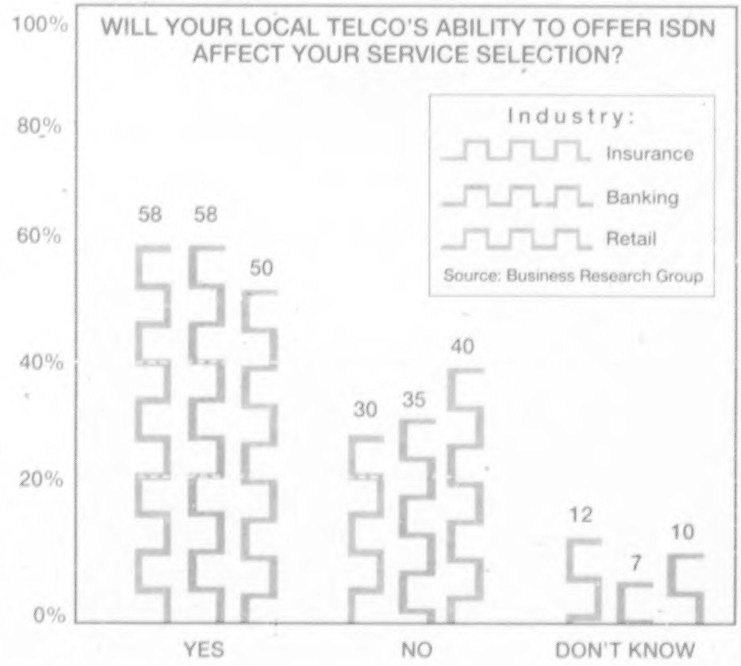
"We wanted to negotiate large-scale purchases of National ISDN-1 to make a statement," Purves said. "National ISDN-1 is the future of ISDN. We need to move to a fully standards-based platform. We want to get the platform in place and slowly but surely migrate our existing ISDN customers to National ISDN-1."

That attitude can be found at all the Bell regional holding companies, Purves said. In talking with his fellow ISDN product managers, Purves has found that "all of the regions are negotiating contracts of some form for the purchase and deployment of National ISDN-1."

Vendors too have noticed a large-scale commitment to ISDN. In addition to the Pacific Bell deal, Northern Telecom announced in November that it will install the industry's first National ISDN-1 software upgrade in March in a DMS SuperNode switch in a Bell Atlantic central office in Arlington, Va. National ISDN-1 capabilities were also important in Ameritech's recent $1-billion switch procurement, of which Northern Telecom won a 67% share, said a Northern Telecom spokesman.

"We think it's very encouraging," the spokesman said. "We're not even in 1992 yet and already three [RHCs] are making significant commitments to deploy National ISDN-1 in their networks."

Northern Telecom will begin the verification and testing process for National ISDN-1 in the first quarter, with general availability slated for July. AT&T's 5E8 software generic, which will include National ISDN-1, should be available in September, but a first office application should occur sometime before then, an AT&T spokesman said.



Source: Business Research Group

Of 100 business users surveyed, more than half said their local telephone company's ability to offer integrated services digital network would be critical to their selecting it as a local service provider. Insurance and banking industries were among the most interested in ISDN's potential. Complete survey results are detailed in Service Marketing Strategies: The Impact of ISDN, a new report from Business Research Group.

Siemens, Reliance break off talks

Steven Titch
News Editor

Siemens and Reliance Electric Co. have ended their acquisition courtship after Reliance grew uneasy with several conditions that the German conglomerate brought to the table.

Reliance, Lorain, Ohio, now says it will concentrate on its manufacturing business and is no longer for sale.

"We're off the market," said John Hudson, assistant treasurer for Re-

International Review and Forecast

Global economy, changing political scene play havoc with spending

CAROL WILSON, Editor

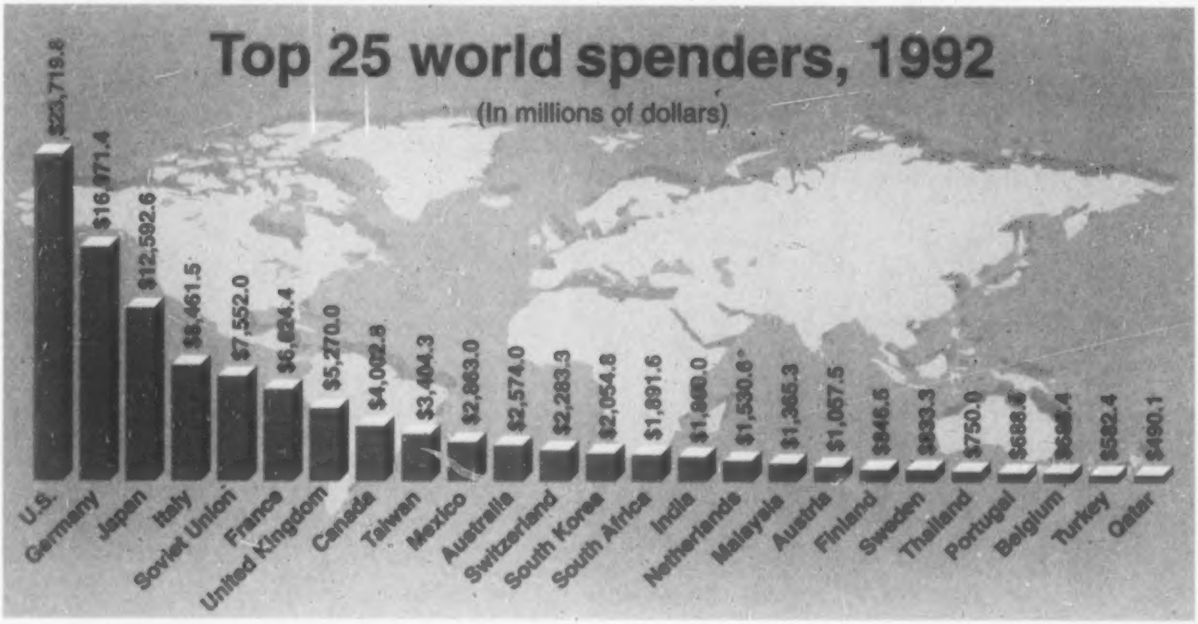
The critical role that telecommunications will play in the global economy has become a universal truth. Developed nations want a sophisticated telecom infrastructure to provide a competitive edge for their business interests. Developing nations need a basic telecom network to provide the foundation for economic growth.

Given these fundamental realities, construction budgets for public network carriers around the globe should be on a steady upward trend.

As this year's *Telephony* International Review and Forecast shows, however, there is no such certainty to global spending trends, a strong indication that planning for the economies of the future is being hampered by the uncertain economic and political present. Worldwide recession has affected demand for telecommunications services and, in areas where carriers are private entities, forced re-evaluation of spending plans.

In addition, the move toward privatization of government-owned PTTs and the introduction of competition into some aspects of former monopoly markets are adding to the impossibility of extrapolating a global trend from the jumble of individual market spending figures. Finally, among major carriers worldwide, there is a strong trend toward building a global market for multinational corporations and investing in public network carriers in developing nations. France

continued on page 22



Top 25 world spenders, 1992

(In millions of dollars)

1991-92 WORLD SPENDING
($-in millions)

	1991	1992
Europe	**45,336.9**	**46,100.0**
Country		
Austria	1,053.1	1,057.5
Belgium	685.4	688.4
Cyprus	60.1	42.0
Denmark-Jydsk Tel	202.3	207.7
Finland	790.6	846.5
France	6,445.4	6,624.4
Germany	16,685.7	16,971.4
Iceland	26.1	36.2
Italy	8,461.5	8,461.5
Luxembourg	54.6	58.6
Netherlands	1,530.6	1,530.6
Norway	455.9	500.0
Portugal	596.8	688.6
Sweden	844.4	833.3
Switzerland	2,193.2	2,283.3
United Kingdom	5,251.2	5,270.0
North America	**29,738.3**	**30,642.6**
Country		
Bahamas	26.1	38.5
Bermuda	4.7	18.5
Canada	3,824.9	4,002.8
Mexico	2,529.0	2,863.0
U.S. -Regionals	14,479.0	14,993.2
-Independents	4,824.8	4,626.6
–IXCs	4,050.0	4,100.0

Source for all figures: International Telephony/Market Research

Telecom Spending *continued*

Telecom, Germany's Deutsche Bundespost Telekom, the U.K.'s BT (formerly British Telecom) and the seven Bell regional holding companies in the U.S. are all active players in this new investment game.

The only market that remains easy to forecast amid such uncertainties is cellular communications, which continues to boom worldwide. As cellular subscribership continues to grow, cellular carriers are expanding and improving their networks in virtually every market. This trend will continue in the coming year as cellular providers also build digital systems.

Some Boom Areas

In general spending, the greatest percentage increase is in the Far East/Pacific Rim region, where overall spending will rise almost 14% in 1992 (see page 25). The diversity of spending trends in the Pacific, however, illustrates three of the major global trends: substantial new investment by smaller countries such as Malaysia and Taiwan; the advent of competition in more mature markets such as Japan and Australia; and the globalization of carriers such as Singapore Telecom.

Competition is at hand for Nippon Telegraph and Telephone Corp. The Japanese giant is being forced to cut its costs to meet competitive pricing strategies, reducing its estimated construction budget by 16% in 1991. NTT has been able to use competition from vendors outside its own market—such as Northern Telecom, which is supplying its DMS-10 switch to NTT—to put pressure on major suppliers like NEC and Fujitsu to drive their prices down, says J. Michel Guite, vice president and telecommunications equipment analyst with Salomon Brothers in the U.S.

"NTT used to seek tailored technology built to its rigid specifications," he says. "But with the DMS-10, for example, they have seen that something that wasn't designed from the ground up for NTT could

The only market that remains easy to forecast amid such uncertainties is cellular communications, which continues to boom worldwide. As cellular subscribership continues to grow, cellular carriers are expanding and improving their networks. . . .

work. [NTT has] agreed to re-examine the need for detail in its specs and to move more toward international standards."

This move to standard equipment platforms, driven by customized software, is affecting other markets as well, as carriers such as France Telecom and Germany's Telekom move away "from old handicraft technology with cumbersome specs," says Guite. The common equipment platforms are areas in which vendors compete more heavily on price, giving carriers more value for their investment.

Competition is affecting the Australian market in a different way. Under a plan announced in November 1990 by the Australian government, Telecom Australia and OTC, the two existing monopoly carriers for local and long-distance service, respectively, are to be merged into one entity, and a second carrier will be created to provide competition.

Australia Telecom is preparing for that competition with investment in its infrastructure—its construction spending was up 15% in fiscal 1991. At the same time, a tight economy is holding down growth in revenues below historical levels and prompting tight spending controls, according to the company. Meanwhile, the country's new private-sector carrier, Optus, plans to spend $3.1 billion over the next six years to build its network.

Singapore Telecom expects to face privatization in the coming year and also has made substantial investment—$260 million, up 113%—to deploy digital technology and fiber optics in preparation for its new status. The company's major focus, however, is on the introduction of new national services and the globalization of its activities, through joint-venture companies, such as those already established in Thailand and in Sri Lanka, and through other strategic alliances the company hopes to form. Singapore Telecom has a construction budget of $3.7 billion for the next five years.

Western European PTTs also are preparing for competitive, privatized markets and the single European market by investing in their network infrastructure and by expanding into global markets. The construction budgets of Western Europe rose 9% to $45.3 billion, paced by a 40% increase in spending by Telekom, which is rebuilding the former East Ger-

continued on page 24

Cellular subscribers outside Europe, 1991

North America

Canada	628,000
Caribbean	7,500
Mexico	150,000
U.S.	7,200,000

Africa & North Africa

Algeria	2,300
Mauritius	750
Morocco	1,000
South Africa	9,000
Tunisia	1,200

South & Central America

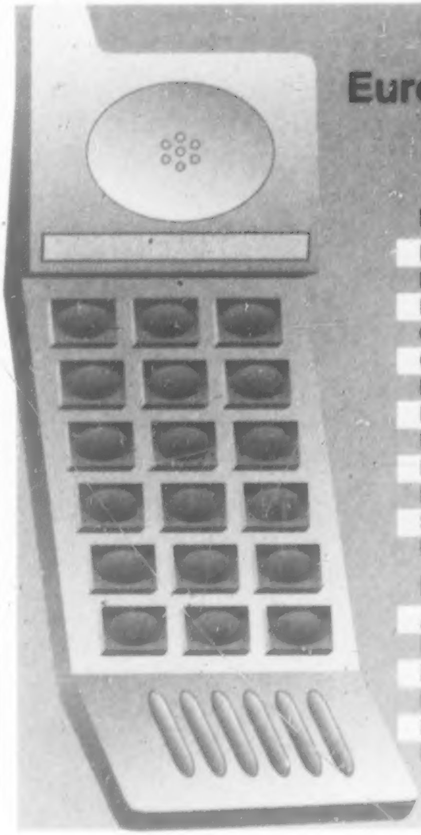
Argentina	25,600
Brazil	6,000
Chile	26,000
Costa Rica	1,400
Guatemala	900
Peru	5,000
Venezuela	8,100

Middle East & South Asia

Bahrain	5,300
Egypt	4,500
Israel	22,300
Jordan	1,500
Kuwait	20,000
Oman	3,700
Pakistan	6,000
Saudi Arabia	22,300
Sri Lanka	1,600
Turkey	47,500
United Arab Emirates	28,900

Far East & Pacific

Australia	320,500
Brunei	4,000
China	39,100
Hong Kong	158,000
Indonesia	15,500
Japan	1,687,000
Macao	3,200
Malaysia	123,200
New Zealand	73,200
Philippines	35,900
Singapore	65,500
South Korea	161,200
Taiwan	176,000
Thailand	124,300



European Commission (EC) and European Free Trade Association (EFTA) cellular subscribers

(In thousands)

EC	1988	1989	1990	1991	1995*
Belgium	19	31	42	54	125
Denmark	100	126	150	176	270
France	110	189	295	375	1,100
Germany	96	157	275	555	2,000
Greece	0	0	0	0	15
Ireland	7	14	25	32	75
Italy	31	61	266	536	1,346
Luxembourg	1	1	1	1	2
Netherlands	36	59	80	119	320
Portugal	2	5	7	13	45
Spain	11	28	55	110	615
U.K.	480	802	1,155	1,238	1,900
EFTA					
Austria	30	48	72	117	245
Finland	103	156	225	292	365
Iceland	4	7	10	13	28
Norway	151	173	205	235	315
Sweden	239	340	485	594	695
Switzerland	43	83	128	178	330

*Estimate

Note: Liechtenstein is also a member of EFTA. No reported figures are available for Liechtenstein.

Telecom Spending *continued*

many's telephone network, and more modest increases in Italy, Spain and Portugal.

For the future, Germany's Telecom 2000 program to upgrade the telecommunications infrastructure in the east of the country envisages the expenditure of $35 billion to support 7.2 million new telephone lines, 68,000 pay phones, 360,000 fax machines, 50,000 packet data connections, 5 million cable TV subscribers and 300,000 mobile users. Italy plans to invest almost $9 billion annually in the period to 1995 to overhaul its antiquated telecommunications infrastructure.

In addition, major European carriers such as France Telecom and BT are expanding into global markets. France Telecom celebrated its new status, effective Jan. 1, 1991, as a state-owned independent carrier by actively pursuing alliances and partnerships abroad. Currently it has a presence in 15 companies, including part ownership of networks in Argentina and Mexico, where it joined with Southwestern Bell and others to buy a major stake in Telmex.

Within Europe, France Telecom is focusing on one-stop shopping and billing agreements, mobile communications and the interconnection of the integrated services digital network and videotex networks.

Outside Europe, France Telecom has entered into agreements with other carriers to meet the needs of international corporations through interconnection of networks and network management capabilities, according to a statement from the company.

BT created its Syncordia subsidiary in September 1991 to provide data, voice and image communication services to multinational corporations. Originally conceived as a consortium, Syncordia is still expected to include Telekom and NTT. Negotiations with the two carriers are still

> *Western European PTTs also are preparing for competitive, privatized markets and the single European market by investing in their network infrastructure and by expanding into global markets.*

under way, according to Syncordia officials.

BT rival Cable & Wireless, already present in a number of key international markets, is looking to beef up its profile in the U.S. and Eastern Europe. At home, the group's Mercury subsidiary is expected to invest another $1.8 billion in its network by 1993. There is some speculation that C&W could float Mercury off as a separate entity or take an equity partner to help fund this expansion.

The European picture was further brightened by the opening of Eastern European markets in former Communist nations now eagerly embracing capitalism and free enterprise. As expected, countries with the strongest geographical and historical ties to the West led the way. For instance, U S West's cellular joint venture with the Hungarian PTT signed up 4000 subscribers in the first three months of operation, far exceeding expectations. The initial success of joint venture company Westel Radiotelefon Kft. has spurred further investment and growth of the system.

U S West, along with Bell Atlantic and the Czech PTT, cut over cellular systems in Prague in mid-September. The two RHCs are also working with both the Czech and Slovakian PTTs, not only on cellular, but on a digital overlay network with an eye toward extending modern high-speed voice and data services to the states that make up the country.

And, after a drawn out bidding process, the Polish government awarded the national cellular franchise to the Ameritech/France Telecom partnership. Ameritech, which in 1990 lost out on a cellular bid in Germany, had aggressively pursued Poland. At one point, the company was successful in overturning an earlier bid that had been granted to a consortium of Polish companies.

1991-92 WORLD SPENDING
($-in millions)

	1991	1992
South & Central America	**1,103.6**	**1,335.1**
Country		
Argentina	248.0	245.5
Brazil	468.8	389.4
Chile	42.1	58.2
Colombia	198.8	496.3
Costa Rica	29.3	28.1
El Salvador	22.9	23.5
Panama	45.3	46.1
Peru	NA	NA
Venezuela	48.4	48.0
Africa	**1,847.3**	**2,460.5**
Country		
Gambia	32.1	32.1
South Africa	1,400.0	1,891.6
Zimbabwe	415.2	536.8

1991-92 WORLD SPENDING
($-in millions)

	1991	1992
Far East & Pacific	**20,966.0**	**23,848.5**
Country		
Australia	2,655.3	2,574.0
Hong Kong	216.6	229.0
Japan	12,592.6	12,592.6
Malaysia	701.1	1,365.3
New Zealand	348.0	348.0
Philippines	86.2	191.1
Singapore	259.5	339.4
South Korea	2,054.8	2,054.8
Taiwan	1,624.7	3,404.3
Thailand	427.2	750.0
Middle East & Southern Asia	**3,636.2**	**3,736.8**
Country		
Bahrain	54.8	54.8
Egypt	69.9	71.4
India	1,800.0	1,800.0
Israel	411.5	411.2
Jordan	6.7	12.1
Nepal	16.4	16.4
Oman	78.0	78.0
Qatar	490.1	490.1
Syria	111.4	111.4
Turkey	488.4	582.4
United Arab Emirates	109.0	109.0

In contrast to the heavy activity in these three countries, the instability of Romania, the civil war in Yugoslavia and the more entrenched socialist regimes in Bulgaria and Albania have kept investment away.

In the disintegrating Soviet Union, however, business proceeds in spite of the political upheaval that makes daily news there. AT&T continues to open more circuits into the country. In October, AT&T cut over a gateway switch in Armenia. After the August coup, AT&T successfully pressed the U.S. government to allow it to use the Intersputnik circuits for which the carrier had negotiated several years ago.

RHCs, PTTs and manufacturers all say that since the coup, authority has transferred to republic-level governments. Manufacturing and infrastructure agreements continue to be reached, especially with enterprises in Russia, Byelorussia and the Ukraine, as well as the newly independent Baltic states, but Western companies still say the success and prof-

continued on page 26

itability of these ventures depend ultimately on how the economy shakes out.

South America has been an area of significant activity, although a true measure of the market there is difficult to get, given the effect inflation, currency devaluations and changes have had on the economies of the area. A number of South American nations, including Argentina, Venezuela, Chile and Brazil, are looking at major improvements in their telecommunications infrastructure.

Just to the north, Mexico logged a 63% increase in construction spending by Telmex, buoying the otherwise sluggish North American market. Construction spending by local exchange carriers in the United States, the world's largest single market, fell to $19.3 billion *(Telephony, Dec. 16, 1991, page 16)*.

The U.S. market has been plagued by uncertainty, and it is reflected in the spending of LECs. The RHCs, which represent the vast majority of the U.S. market, saw spending decrease by almost 2%. Independent telephone companies, representing the rest of the market, cut construction spending by 3%.

Key factors affecting the U.S. market include a weak economy, which has driven down demand for new services and access line growth, and regulatory and technological questions. U.S. carriers are waiting for action by the federal government on issues including whether phone companies will be allowed to provide video entertainment services to the home, and whether the Bell companies will be allowed to manufacture equipment and provide information services and long-distance telephone service.

In addition, U.S. carriers, like many of their international counterparts, are waiting for finalization of standards for new technology such as the synchronous optical network before moving ahead with deployment.

"The Bell companies must have a more comfortable environment in which to spend," says Steve Sazegari, telecommunications analyst with Dataquest, San Jose, Calif. "Right now there are many uncertainties in the regulatory arena, in the standards arena and in the technology arena. For the RHCs to overcome this will take time. Setting aside the economy for a moment, I think we see some movement toward more expenditures in the 1994-95 time frame, especially with standards and regulatory problems clearing up."

Mobile Communications

The boom in mobile communications worldwide is well-documented and has reached markets as diverse as Thailand and Italy. In the former, capacity of analog cellular systems was expected to grow from 70,000 to 200,000 over the past year, and to reach 290,000 in the next year, when initial digital service will be launched. In Italy, the total number of subscribers for mobile phones and pagers jumped from 119,000 to 346,000 in 1990, with 200,000 of those new subscribers buying mobile voice service. A significant increase in price for access to mobile services was expected to slow that demand in 1991.

In the European Economic Community market, cellular subscribership is expected to grow 36% to 3.2 million this year and 143% over the next four years to reach nearly 8 million by 1995.

Investment in cellular networks is taking on a new dimension with the conversion to digital technology. In Europe, Australia and parts of the Middle and Far East, this involves deployment of GSM (global system for mobile communications), a technology that will create a single standard to ultimately replace the jumble of analog mobile systems. Although GSM went on the air officially in July 1991 in limited areas, the complexity of the standard and a lack of GSM terminals has slowed genuine commercial operations. That picture is expected to change in the coming year, fueling more spending by the cellular carriers.

The U.K.'s PA Consultancy Group Ltd. forecasts a GSM subscriber population of 3 million by 1995, rising to 14 million by the end of the decade. Personal communication networks, presently being built in the U.K. and expected to get the green light in Germany in early 1992, will boost cellular telephone customer base.

In the U.S., the digital cellular picture is less clear. While the majority of U.S. carriers are ready to press ahead with implementation of one digital standard, known as time division multiple access, a minority group still backs a different set of standards, known as code division multiple access. It is not yet certain how this difference of opinion will affect digital system deployment by U.S. carriers. ■

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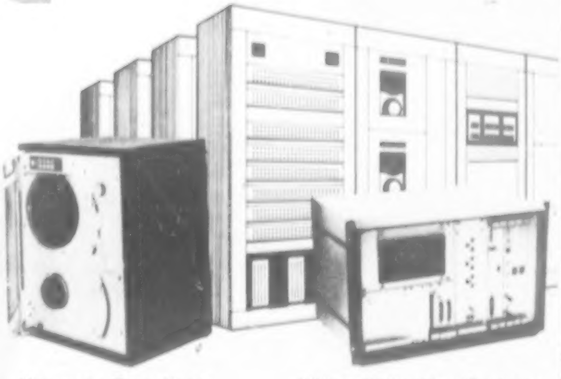

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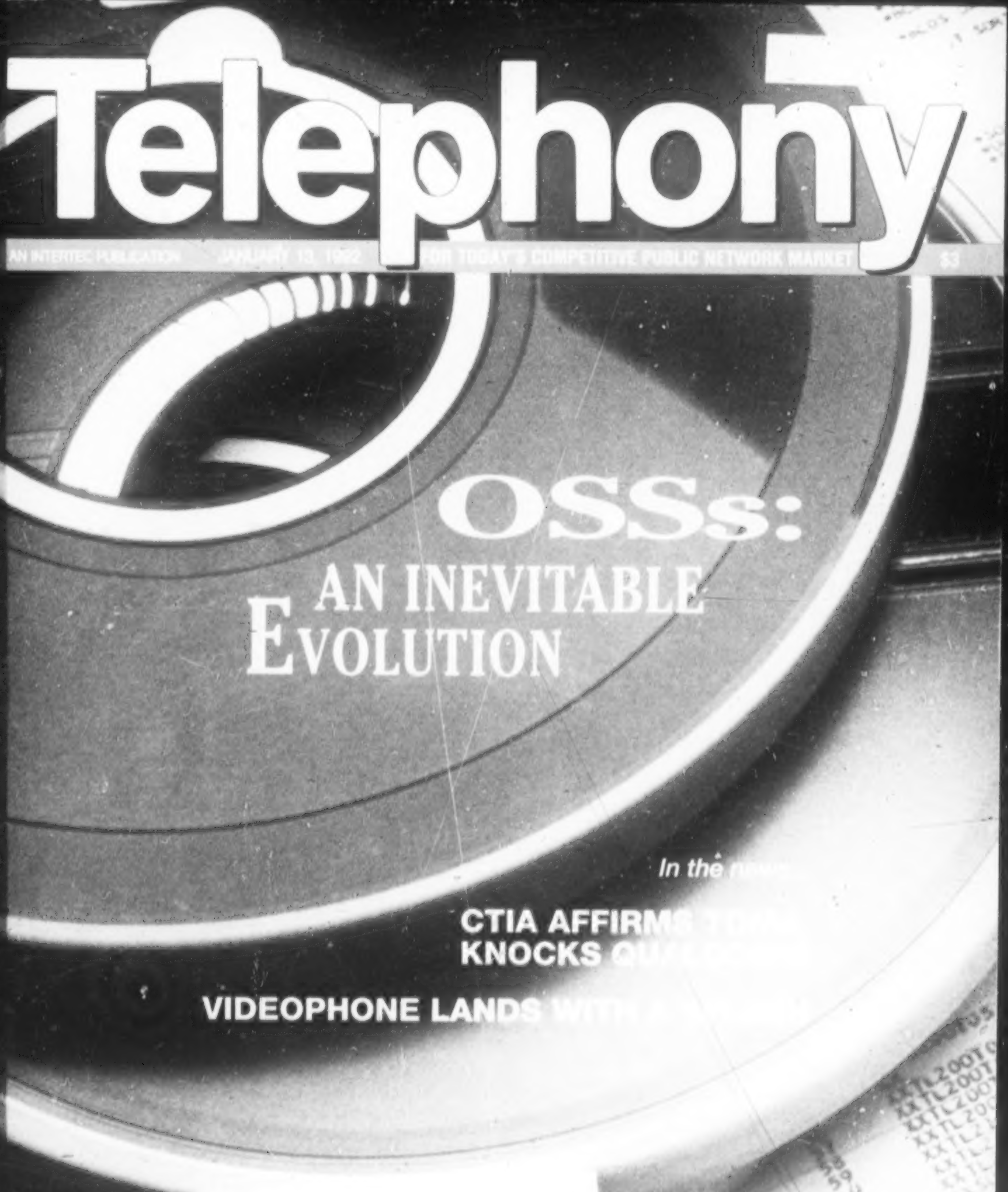

OSSs:
AN INEVITABLE EVOLUTION

In the news

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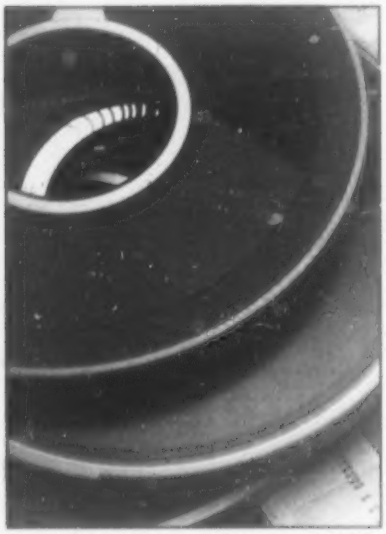
Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET



In the emerging all-fiber network, OSSs will be far more critical. But most of the operations support systems in place today are incapable of supporting the network's up-and-coming technologies. Cover photography courtesy of EDS

NEWS OF THE WEEK

8 **CTIA LAYS DOWN THE LAW**
The board of directors of the cellular trade group affirms its decision to endorse the TDMA digital cellular standard, setting back Qualcomm Inc. and its competing CDMA technology

8 **DSC LANDS PAC BELL CONTRACT**
Pacific Bell agrees to buy signal transfer points from DSC Corp., reaffirming its commitment to the vendor despite flaws in the gear that helped contribute to last summer's much-publicized outages

9 **AT&T DEBUTS VIDEOPHONE**
The product lands with a big splash, but the question remains: Will consumers bite?

10 **SPRINT PURSUES U.K. FIBER NETWORK**
The U.S. carrier makes inroads into the U.K. market by filing for a license to build a synchronous fiber network with British Waterways

12 **NORTHERN UNVEILS TELEPHONES**
Selling network services such as three-way calling and caller ID could become easier for telcos thanks to a new line of user-friendly telephone sets from Northern Telecom

FEATURES

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By Greg M. Jacobsen. Many operations support systems currently in operation are monoliths. Modern OSSs must be put in place to properly support the networks of today and tomorrow

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By Rony Holter. It will require quantum leaps for existing OSSs to use the management information that is built into SONET elements to evaluate network performance

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By Carol Wilson. What is the future of telecommunications in 1992? *Telephony's* editor looks into the crystal ball

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TELEPHONY (ISSN 0040-2656) is published weekly (except for a combined issue the last week of December) for $45.00 one year, $75.00 two years. Outside U.S. $80.00 one year. Air mail for $185.00 for U.S.; $225.00 for Canada. Air Express one year outside U.S. and Canada for $160.00. Single copies $3.00 each (payable in advance); outside U.S. add $1.00. Subscription rates apply to employees of operating telephone companies, telephone consultants, contractors, interconnect companies, specialized common carriers, military, government, associations, private communications users, schools, libraries. Published by Intertec Publishing Corp., 9221 Quivira Rd., Overland Park, KS 66215. Second-class postage paid at Chicago, IL and additional mailing offices. POSTMASTER: Send address changes to TELEPHONY, P.O. Box 12960, Overland Park, KS 66282-2960. Copyright 1992 by Telephony Division, Intertec Publishing Corp. All rights reserved. Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by Telephony for libraries and other users registered with the Copyright Clearance Center provided that the fee of $1.50 per page is paid directly to CCC, 21 Congress St., Salem, MA 01970. Special requests should be addressed to the publisher.

with the sale. "This was a very, very good result," said Economy Minister Domingo Cavallo.

Because the auction was so heavily oversubscribed, investors will not get all the shares for which they bid. Full details about who eventually gets what will be announced later.

Officials expect the auction of a similar state interest in the northern sector—in which a consortium headed by Italy's Stet and France Cables et Radio has 60% under last year's privatization—will go ahead in March "with similar results."

Reportedly, that consortium, known as Telecom, was not able to provide the necessary documentation in time for the northern share sale to go ahead in December as originally scheduled.

Revenues from the sale will be used partly to pay off old debts and unpaid bills owned by the former state company, Entel, to equipment suppliers. Funds also will be siphoned off to shore up the government's all but bankrupt pension funds.

It remains unclear whether suppliers' bills will be paid in full. Last year, senior government officials warned equipment companies they could not expect to get more than half the debts left behind by Entel.

At the time of last year's privatization, Entel was estimated to owe at least $1 billion to suppliers and a further $700 million to overseas creditor banks. The Argentine treasury has taken over foreign bank debts, but so far there has been no similar government undertaking on the unpaid supplier bills. ■

Correction

A chart entitled "Distribution of 1991 spending" in *Telephony's* domestic review and forecast (Dec. 16, 1991, page 20) incorrectly listed MIS/DP spending by Bell regional holding companies as $105 million. The correct figure is $1.05 billion.

FOR A LITTLE GUY
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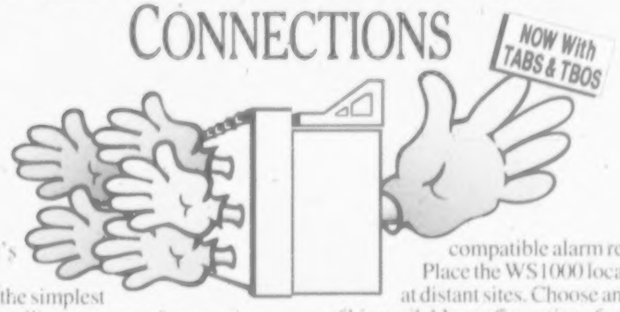
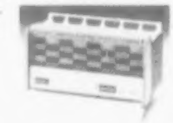


Westronic's WS1000 Remote is the simplest and most intelligent means of converting multiple discrete alarm, status and control interfaces to an easy-to-handle TABS or TBOS serial interface. This little guy will streamline your site's alarm and control wiring to save you time and money. Virtually eliminate unknown errors caused by mistakenly cut or rerouted wires for equipment such as SLC-96's.

Flexibility is this guy's strength. Mount him in an equipment bay or on a distribution frame. Tie the WS1000's host interface into anyone's TABS or TBOS compatible alarm remote. Place the WS1000 locally or at distant sites. Choose any one of his available configurations for the lowest project cost.

For even broader solutions covering many types and quantities of interfaces, contact us about this guy's bigger brothers, sisters and parents. They all have the right connections.



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News Bytes

Cerjac Inc., an Acton, Mass.-based manufacturing startup, began shipping its first integrated synchronous optical network and T-carrier test and monitoring set in December. The product, Model 156, is designed for use by carriers and equipment manufacturers involved in development, manufacture, installation and maintenance of SONET transmission systems.

GTE Customer Networks, GTE's service organization that sells and maintains PBXs, voice mail systems and data communications equipment, was one of five companies that **Synoptics** named as Authorized Customer Support Partners. As such, Atlanta-based GTE Customer Networks will provide advanced support for users of Synoptics local area network equipment. Already a value-added reseller of Synoptics' products, GTE was required to meet a special set of criteria that recognizes significant investments in training, technical staffing and service capabilities.

PictureTel Corp., Peabody, Mass., has added six regional distributors to its Select Dealer Program: CAE Link, Alexandria, Va.; Davidson & Associates, Seattle; ICS Executone, Rochester, N.Y.; Peirce-Phelps, Philadelphia; Telcorp, Rolling Meadows, Ill.; and US Tele-Centers, Boston. The dealers distribute PictureTel's complete family of videoconferencing products.

Centel Corp., Chicago, and **Lincoln Telecommunications Co.**, Lincoln, Neb., have formed a general partnership that will control Centel Cellular Co.'s 55.2% interest in Omaha Cellular Ltd. Lincoln Telecommunications owns 50% of the new partnership and has assumed operating control of the franchise, which provides cellular communications service in Omaha, Neb., and nearby areas. Centel previously operated the franchise. After five years, Lincoln will have an option to purchase Centel's remaining interest in the partnership.

Telephony

Wh[illegible]

RHC [illegible]
STAY [illegible] TARGET

AT&T FORMS
UKRAINE VENTURE

MONDAY, JANUARY 20, 1992 Volume 222, No. 3

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

A new report reveals that the information many telephone companies use to justify the cost of installing fiber in their networks is questionable at best. Probe Research targets the problems and suggests reforms. Cover artwork by Laura M. Doyle

NEWS OF THE WEEK

8 **RHCs HOLD TO ISDN PROJECTIONS**
A new Bellcore report says 61.9 million lines will be capable of delivering the digital network technology by 1994

9 **AT&T FORMS VENTURE IN UKRAINE**
The deal to modernize the republic's infrastructure establishes AT&T alongside some of the Bell regional holding companies in taking advantage of opportunities in the C.I.S.

9 **NEW JERSEY ADOPTS INCENTIVE REGULATION**
Proponents say plan will spark fiber deployment statewide

9 **ANOTHER ARGENTINA DEAL COLLAPSES**
GTE joins Bell Atlantic as the second U.S. phone company jilted as a result of Argentine business methods

10 **SW BELL CHARTS SONET COURSE**
Southwestern Bell will begin to evolve its network to SONET this year after economic studies confirm its cost-effectiveness and tests of OC-3 point-to-point gear bear out

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By Timothy Rubert and Kevin Dickinson. Hybrid T-1/ISDNs provide users with a host of advantages and can be implemented using ISDN access servers

26 **WHAT DO TELCOS KNOW ABOUT THE LOOP?**
By Allan Tumolillo. A new study by Probe Research reports that the information many telcos use to justify putting fiber in the subscriber loop is fundamentally flawed

30 **ISDN LOOKS FOR BIG MO IN 1992**
By Ann H. Lindström. Bellcore's National ISDN-1 standard has breathed new life into ISDN. Starting next year, building the renewed technology's infrastructure promises to be intense

44 **PERSPECTIVES**
By Carol Wilson. The COMPASS broadband experiment almost overshadows Super Bowl excitement for those in U.S. West's Minneapolis office

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TELEPHONY (ISSN 0040-2656) is published weekly (except for a combined issue the last week of December) for $45.00 one year, $70.00 two years. Outside U.S. $80.00 one year. Air mail for $185.00 for U.S., $225.00 for Canada. Air Express one year outside U.S. and Canada for $150.00. Single copies $3.00 each (payable in advance; outside U.S. add $1.00). Subscription rates apply to employees of operating telephone companies, telephone consultants, contractors, interconnect companies, specialized common carriers, military, government, associations, private communications users, schools, libraries. Published by Intertec Publishing Corp., 9221 Quivira Rd., Overland Park, KS 66215. Second-class postage paid at Chicago, IL and additional mailing offices. POSTMASTER: Send address changes to TELEPHONY, P.O. Box 12960, Overland Park, KS 66282-2960. Copyright 1992 by *Telephony* Division, Intertec Publishing Corp. All rights reserved. Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by *Telephony* for libraries and other users registered with the Copyright Clearance Center provided that the fee of $1.00 per page is paid directly to CCC, 21 Congress St., Salem, MA 01970. Special requests should be addressed to the publisher.

Bellcore report shows most RHCs maintaining ISDN course

Ann H. Lindstrom, Assistant Editor

A total of 61.9 million U.S. telephone lines will be capable of delivering integrated services digital network by the end of 1994, according to a report released by Bellcore last week. The document, ISDN Deployment Data, confirms that the three-year ISDN deployment plans for most of the Bell regional holding companies have held steady since the initial commitments were made six months ago.

Although two Bell regional holding companies lowered their goals by a combined total of 36%, they blamed the stumbling economy for their adjustments.

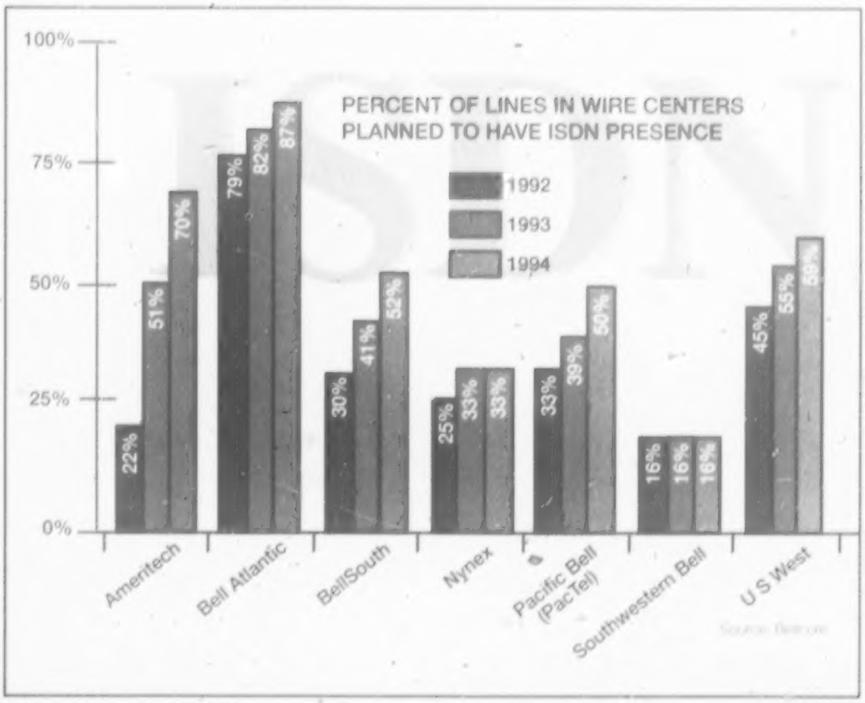
Another two RHCs, however, increased their projected goals by a total of 15%. The three remaining companies' projections remained the same, according to Dick Aloia, Bellcore's assistant vice president of network access technology and ISDN project coordinator

Ameritech now is aiming for 70% by 1994, instead of 90%. It hopes to reach 90% by 1996, said Aloia. Southwestern Bell now plans to equip 16% of its lines by 1994, instead of 32%, he said. Spokesmen for both RHCs said that, in spite of the readjustments, neither company has reduced its commitment to the National ISDN-1 standards effort, which calls for accelerated deployment, switch interoperability and customer premises equipment portability and increased availability.

On the upside, U S West increased its goal from 51% to 59%, and Nynex stepped up projections from 26% to 33%, said Aloia. Pacific Telesis, BellSouth and Bell Atlantic are sticking with their original numbers, which are 50%, 52% and 87%, respectively.

"When you add it all up, the schedules are virtually the same as they were in July," said Aloia. "Every time we reissue this report, things will become more firm. The July predictions were made for something that was to begin more than a year from that time. These projections reflect deployment that will begin nine months from now."

Indeed, many of ISDN's proponents predict 1992 will be the biggest year yet for ISDN deployment (see article on page 30).



Source: Bellcore

The report, which will be updated every six months, is Bellcore's answer to the industry's request for specific information on RHC ISDN plans. It represents the first time that this information has been offered in one study, he added. Telephone companies are expected to use that data as reference when customers with multiple locations ask about the timing of ISDN rollouts in different parts of the country.

Although Bellcore is "delighted" with the contents of the report, several industry analysts remain skeptical that, in spite of its increased availability, ISDN will not be an easy sell.

"The telcos won't sell even close to that number of lines," said Steve Sazegari, Dataquest analyst. "The RHCs don't have the applications or prices in place to encourage people to switch to ISDN."

Bellcore, however, expects 20% of ISDN-capable lines to be in use by late in the decade, countered Aloia. "And that is enough to support the technology.

Today there is more demand than availability, and it is not priced as attractively as one would like for mass consumption. But nothing ever starts out with attractive prices," he added, citing the cost cycle of once very expensive videocassette recorders, which are now affordable and popular.

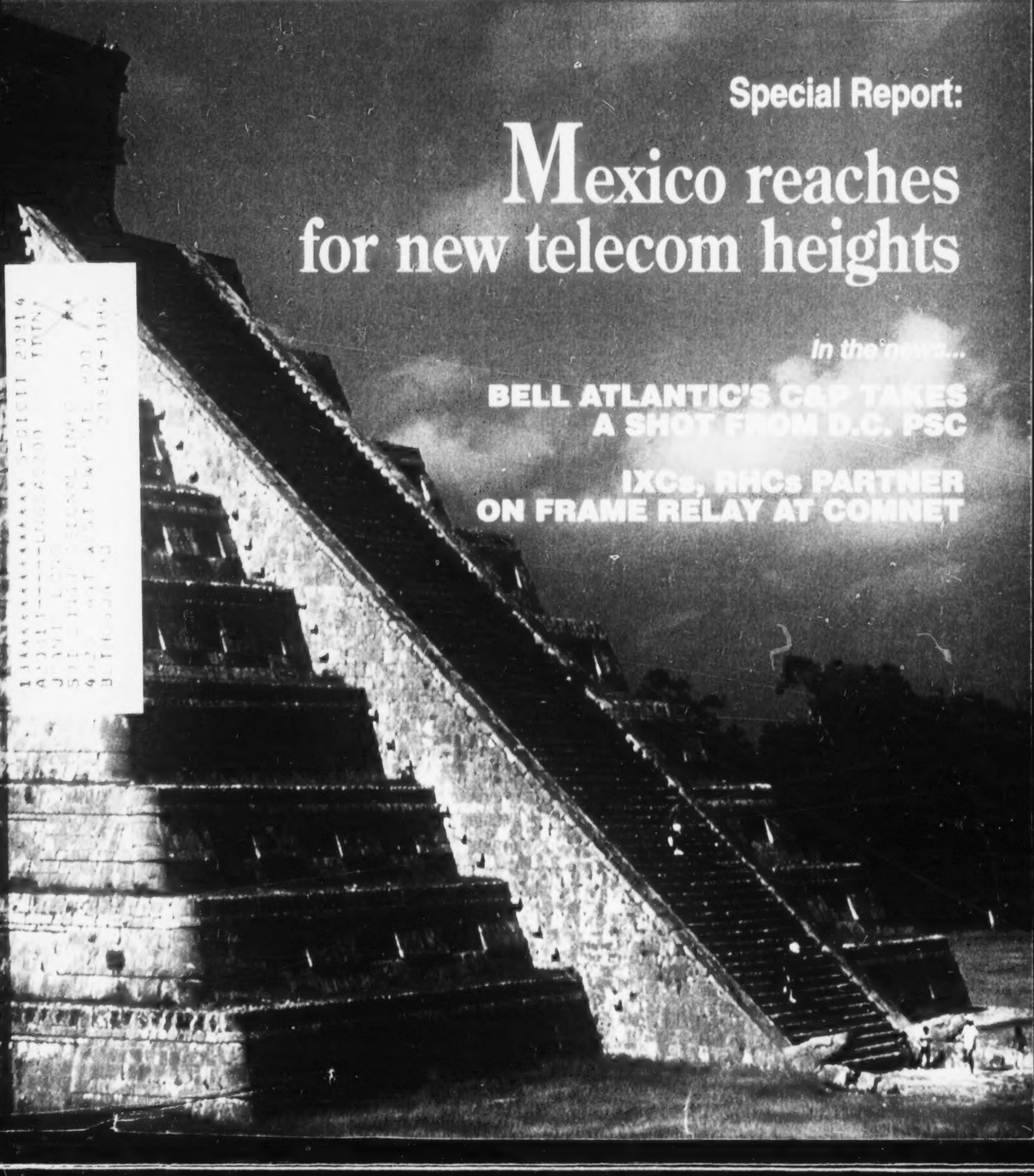
The ratio of lines equipped with ISDN vs. the number of lines in use still is very poor, said Fritz Ringling, Insight Research analyst. Of the 26.4 million ISDN-capable lines available in 1991, only 120,000 were in service nationwide, he said. According to Ringling's data, however, interest in ISDN continues to rise despite the cavernous ratio. The number of companies that had not yet tried ISDN dropped from 78% in 1990 to 50% in 1991. Customers using one to five lines increased from 15% to 25% over the same period.

Ringling, who agreed that 20% use would support the technology if it were attained, pointed out that the telcos will find it difficult to reach the large market for ISDN—residents and small businesses—unless they prepare to make more sales through personal contact, almost on a door-to-door basis.

"You can't sell it on the phone," said Ringling. "You've got to be the Fuller Brush man." ▮

Telephony *Global*

AN INTERTEC PUBLICATION FEBRUARY 3, 1992 FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET $3



Special Report:

Mexico reaches for new telecom heights

In the news...

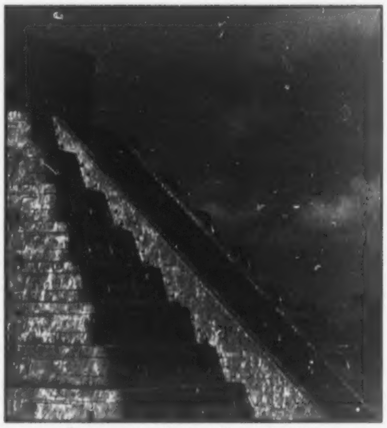
BELL ATLANTIC'S C&P TAKES A SHOT FROM D.C. PSC

IXCs, RHCs PARTNER ON FRAME RELAY AT COMNET

MONDAY, FEBRUARY 3, 1992 Volume 222, No. 5

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET



Prospects of growth are looking up as Mexico reaches for new telecom heights Cover photography by Grafton M. Smith, The Image Bank

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NEWS OF THE WEEK

8 **D.C. PSC DEALS A HARSH BLOW**
In a setback for Bell Atlantic's Chesapeake & Potomac Telephone, the public service commission not only rejects a requested rate increase, but orders a rate cut

8 **RHCs CATCH FRAME RELAY TRAIN**
Nynex and Southwestern Bell team with interexchange carrier partners at Communication Networks '92 to test interoperability of their emerging frame relay networks

9 **BELL ATLANTIC SKETCHES SMDS PLANS**
The company picks a vendor for SMDS gear and discloses its first "pre-SMDS" customer

12 **LIVELY TALK DOMINATES COMNET '92**
Industry bigwigs touch on such hot topics as local exchange deregulation and the need for a national infrastructure strategy

FEATURES

20 **SATELLITES BREAK NEW GROUND**
By John Williamson. As its handle on long-haul, point-to-point telecommunications has been loosened by fiber optic systems, satellite technology has moved on to other arenas

22 **MEXICO REACHES FOR NEW TELECOM HEIGHTS**
By Larry Luxner. Mexico has experienced a dramatic increase in demand for telecommunications—and not only for voice service—yet nine out of 10 families still do not have telephones

30 **CELLULAR IS BIG BUSINESS IN EGYPT**
By Paul Spiers. In Egypt, cellular telephones reign. Since the telecom dynasty took hold in the mid-1980s, subscribership has vastly increased and market competition has been fierce

44 **PERSPECTIVES**
Editor Carol Wilson shares her impressions of ComNet '92

database information and electronic mail via SMDS.

The GSA is connecting to SMDS at a 1.17-Mb/s rate, using Wellfleet routers. The data service is supporting a transmission control protocol/internet program and various applications.

The biggest winner of the day, however, could be Siemens, which beat out AT&T and Alcatel, among others, for the SMDS switching contract. Siemens will be Bell Atlantic's exclusive SMDS vendor until next generation equipment becomes available, most likely in 1993, the Bell Atlantic spokesman said.

Siemens and Alcatel both have licensed technology from QPSX, and Siemens' product is based on the QPSX gear. Because the QPSX prototype equipment was designed for use in private networks, Siemens had to equip the gear with new line cards, updated processors, new interfaces and advanced management and billing functionality, said Pierre-Ives Sibille, manager-data products.

The vendor already had operations experience with the QPSX equipment, because it provided technical support for QPSX during the Temple trial *(Telephony, July 23, 1990, page 11)*. That gave Siemens a "definite" edge in bidding for the final contract, Sibille said.

Siemens has been making a big splash lately, winning a 30% share of Ameritech's recent $1-billion digital switch contract, as well as being named supplier for MCI's next generation, asynchronous transfer mode-based switching platform, said Paris Burstyn, analyst with Business Research Group.

"This really positions Siemens to take a significant role in the U.S. switching market, especially for high-speed switching," Burstyn said. "Everyone else has to get their guard up."

In particular, Fujitsu, whose Fetex-150 switch is being tested by Nynex, must concentrate on converting its trials into contracts, Burstyn said. And AT&T, which has the most to lose and proved it by being virtually shut out in the Ameritech deal, "has to come around and become more responsive to what the market requires," he added. ■

Lively talk dominates ComNet '92

Charles F. Mason, East Coast Bureau Chief

Get enough telecommunications movers and shakers under one roof, and the talk is sure to get lively.

That was certainly the case at ComNet '92 last week. During the show's town meeting, executives from the Bell regional holding companies, competitive access providers and the interexchange carrier industry argued whether deregulation of the local exchange marketplace was moving too quickly.

Meanwhile, in his keynote address, Bellcore President and CEO George Heilmeier called for the industry to fashion a national infrastructure development strategy.

First on the show's agenda was local exchange deregulation. As more

continued on page 14

1991 RHC EARNINGS

(Comparisons made with the same period of 1990. Revenue and income amounts shown in millions of dollars)

	Fourth quarter 1991			Year-end 1991		
	Revenue	Income	Earnings per share	Revenue	Income	Earnings per share
Ameritech	$2742.5 +2%	$199.2 -31%	$0.75 -31%	$10,818.4 +1%	$1165.5 -7%	$4.39 -7%
Bell Atlantic	3098.6 +0%	266.3 +13%	0.68 +5%	12,279.7 0%	-222.7 -117%	-0.53 -116%
BellSouth	3694.5 +1%	386.9 +7%	0.80 +7%	14,445.5 +1%	1471.5 -10%	3.04 -10%
Nynex	3243.1 -6%	-251.3 -514%	-1.24 -513%	13,228.8 -3%	600.8 -37%	2.98 -38%
Pacific Telesis	2466.0 1%	158.0 -19%	0.40 -20%	9895.0 +2%	1015.0 -1%	2.58 0%
Southwestern Bell	2522.4 +3%	316.2 +18%	1.05 +18%	9331.9 +2%	1075.8 -2%	3.58 -2%
U S West	3009.3 +14%	-278.4 -180%	-0.68 -176%	10,577.2 +6%	553.4 -54%	1.38 -56%

All of the Bell regional holding companies' 1991 earnings reflect one-time charges, many related to work force reductions. **Ameritech** reported a fourth-quarter, after-tax charge of $141 million, or 53¢ per share, related to work force and other reductions. **Bell Atlantic** reported a charge of $1.55 billion, or $3.94 per share, for adopting new accounting rules for retiree and health insurance benefits. **BellSouth** reported fourth-quarter charges, totaling 13¢ per share, related to force reduction and an accounting change in its cellular operations. **Nynex** reported a total of $550 million in 1991 fourth-quarter after-tax charges for force reduction programs and business restructuring; its 1990 results include fourth-quarter charges of $211 million for business restructuring and $48 million in the first half of the year for force reduction. **Pacific Telesis** reported 1991 fourth-quarter charges of $122 million for force reduction; its 1990 fourth-quarter results reflect $72 million worth of restructuring charges. **Southwestern Bell** reported a second-quarter charge of $81 million, or 27¢ a share, for refinancing $732 million of long-term debt and a fourth-quarter charge of $30 million, or 10¢ a share, for force reduction. **U S West** reported a charge of $590 million, or $1.47 a share, for force reduction, a new regulation plan in Oregon and other reductions.

Wireless Network Bonus Inside

Telephony

AN INTERTEC PUBLICATION FEBRUARY 10, 1992 FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET $3

Digital cellular: What now?

In the news...

N.E.T. PUTS SONET IN CELLULAR

VIDEO DIAL TONE PLAN COMES UNDER FIRE

MONDAY, FEBRUARY 10, 1992 Volume 222, No. 6

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

Despite CTIA action last month, the future of digital cellular is as cloudy as ever. Cover photo by Steven Hunt, The Image Bank

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NEWS OF THE WEEK

8 **N.E.T. UNIT JOINS SONET AND CELLULAR**
The N.E.T. Adaptive unit plans to unveil a SONET-based broadband switch this week that manages transmission links between cell sites and MTSOs

8 **IOWA, INDIANA TO EYE INFRASTRUCTURES**
Iowa will study the relationship between the state's telecom infrastructure and future economic growth while Indiana Bell concentrates on expanding its SS7 network

9 **AMERITECH UNVEILS FAXTRA SERVICE**
Ameritech Development Corp. launches an enhanced fax service for Chicago customers who are looking for relief from some of the technology's frustrations

11 **VIDEO DIAL TONE PLAN PLEASES FEW**
An FCC proposal that would allow local exchange carriers to offer video dial tone creates a commotion

14 **BT PLANS CELL-BASED POS SYSTEM**
BT hopes its alternative will encourage merchants to shop around for a point-of-sale validation system

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24 **GETTING READY FOR PCS**
By Rick Goldberg and Gary Brush. Although consumers may initially accept a personal communication system without full capabilities, eventually they will demand much more sophisticated service

30 **DIGITAL CELLULAR: WHAT NOW?**
By Steven Titch and Charles F. Mason. The cellular industry had hoped to keep the bad genie of multiple digital cellular formats in the bottle. But debate rages on between CDMA and TDMA camps

38 **THE RIGHT CHOICE**
By Carl Moore. As the telecom market grows and changes, buying the right mobile communications system is critical

52 **PERSPECTIVES**
By Steven Titch. Are the RHCs trampling toward self-destruction?

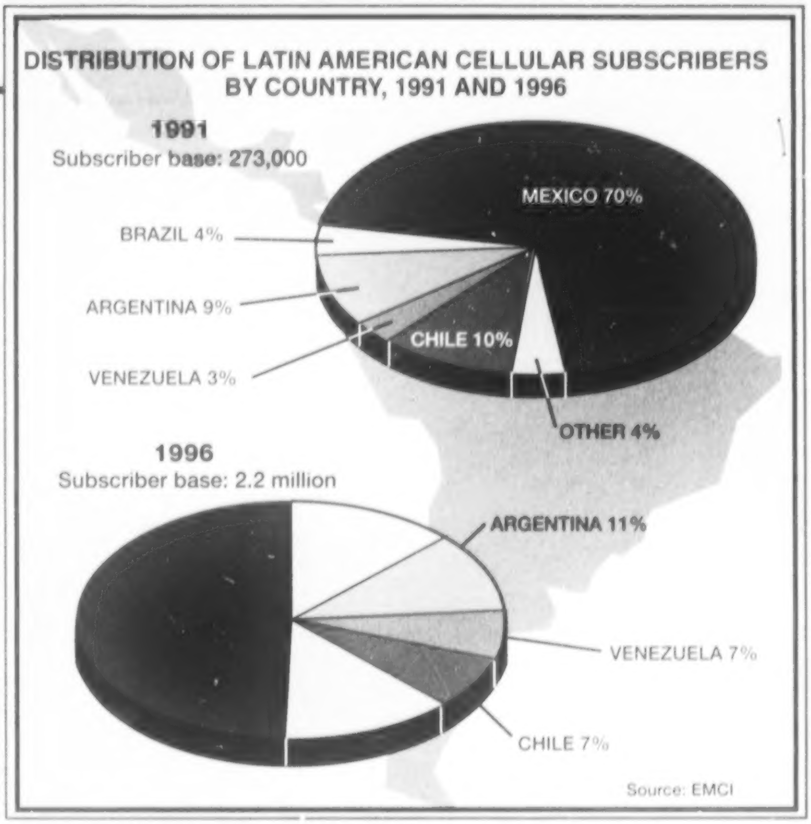
knowledge of the Telecaribe service, but did say it was opposed to direct phone links with Cuba.

Since the fall of Soviet communism and the increasing political isolation of the Castro regime, the same group apparently supports better communications with Cuba.

"Equally important to increasing economic pressure on the Castro regime is the idea of improving communications with the Cuban people," said Jose Cardenas, the group's director of research and publications. "One way to do this is to upgrade the antiquated telephone lines between the U.S. and Cuba. Modernizing the service would open up communications between divided families and also provide a crucial channel to Cuba's persecuted opposition groups."

Sablon, meanwhile, could not be reached for comment. It is unknown whether his company is still in business. AT&T's Johnson could not say when the cable will actually go into service.

"Every international long-distance call and every agreement between a company and a government involves a settlement, a division of revenues," he said. "That is the part we're talking to the Cuban government about. The other money has to do with maintenance and repayment of capital costs, which is the responsibility of the Cuban government. No monies have changed hands as of yet, since it's all contingent upon reaching a settlement agreement."



Source: EMCI

The number of cellular subscribers in Latin America is expected to grow eightfold by 1996, according to forecasts from EMCI Consultants, Washington, D.C. Mexico will continue to serve the largest number of users, but other countries, most notably Brazil, will make large gains as well.

DESIGN: TELEPHONY/PETER D. HYNES

Video dial tone plan pleases few

Charles F. Mason, East Coast Bureau Chief

The Federal Communications Commission's proposal to allow the nation's local exchange carriers to offer video dial tone services drew fire last week from all sides, with some industry players criticizing it as too much and others knocking it for not going far enough.

Under the FCC's proposal, LECs could offer transport and other related video gateway services to independent video program providers. Unlike regular cable TV operators, however, the LECs would not be allowed to offer or control program content in any way.

Not surprisingly, the National Cable Television Association, which has been fighting to keep the telephone companies out of its business, claimed that allowing the LECs to offer video dial tone services will hurt telephone ratepayers and lead to billions in wasted plant.

"If the commission induces telcos to build inefficient, underutilized facilities, it will not only produce distortions in the unregulated video programming marketplace, but also leave captive ratepayers to foot the tab," NCTA told the FCC in written comments.

The trade group added that the FCC has failed to say how it would deal with costs for jointly used video and non-video facilities; the mechanism for assigning these costs among regulated service categories and between regulatory jurisdictions; and the ways in which other so-called safeguards might be deployed to deter "anti-consumer and anti-competitive" practices by the LECs.

In addition, several CATV companies, filing their own separate comments, said the FCC would be violating the 1984 Cable Act passed by Congress if it allowed telcos to get into the CATV business in any form within the LECs' operating territories.

LECs said the video dial tone proposal did not go far enough. Pacific Telesis, for example, said the proposal would not provide "adequate financial incentive" to accelerate the deployment of a broadband technology infrastructure.

The National Telephone Cooperative Association said "there is little reason to conclude that sufficient demand presently exists to justify" offering the video dial tone service. Instead, NTCA urged the FCC to help persuade Congress to drop its cable/telco cross-ownership ban, which would pave the way for telcos to own fully functioning CATV systems.

So far, efforts to win congressional approval of lifting that ban have gone nowhere, despite support from the Bush administration. Instead, Congress is in the process of passing cable reregulatory legislation that fails to address the cable/telco cross-own-

continued on page 14

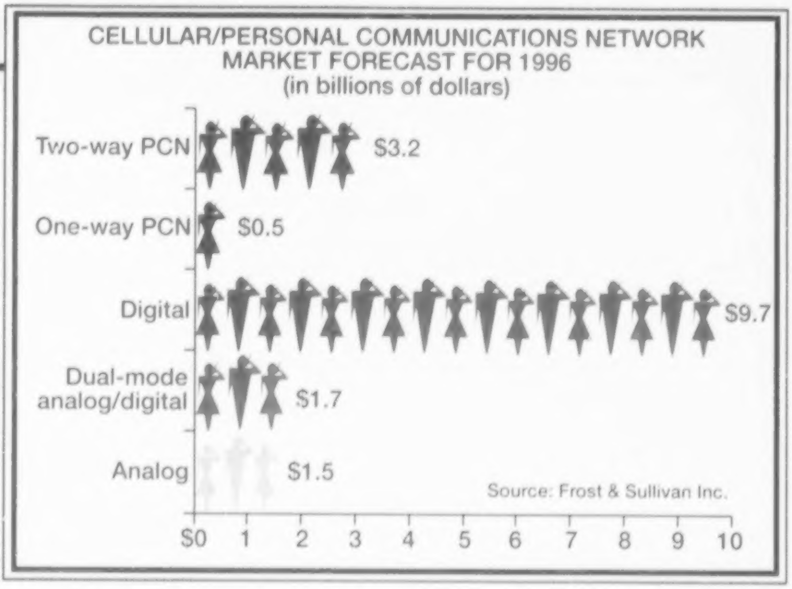
ership prohibition. The Senate passed a reregulation bill earlier this month, and a similar bill is expected to pass the House of Representatives later this year.

Meanwhile, Northern Telecom, which would stand to profit from increased spending on the nation's telecommunications infrastructure, told the FCC that the agency would be making a mistake if it centers its efforts on only bringing more competition to the CATV market. The FCC should be looking at the bigger picture —and encouraging the deployment of advanced services and infrastructure, the company argued.

"This is not about entertainment video," Northern Telecom said. "It is about whether the commission will begin the process of dismantling today's policies that undermine the ability of market forces to pace the development of high-bandwidth public networks that will meet the increasingly video and image-oriented telecommunications requirements of tomorrow."

Northern Telecom also called for a change in the FCC's LEC price-cap plan so that some of the productivity gains can be plowed back into infrastructure investment. The company urged changes in depreciation practices—practices that "retard the deployment of more advanced network capabilities and services."

For its part, the Telecommunications Industry Association, citing the "copper culture" that pervades both the LECs and CATV companies, urged the FCC to allow greater cooperation between the nation's telephone and CATV industries. TIA maintained that fiber-in-the-loop systems for narrowband services are already comparable in cost to their copper counterparts. Yet, "deployment remains piecemeal and chiefly oriented toward field trials," TIA said, because of various factors, including outdated federal regulation.



Source: Frost & Sullivan Inc.

DESIGN: *TELEPHONY*/PETER D. HYNES

DSC celebrates another RHC deal

Bell regional holding companies continue to show support for DSC Communications Corp. Ameritech has ordered an undisclosed amount of signal transfer points (STPs) in DSC's second RHC contract this year.

DSC seems to have successfully shaken off any ill effects from last summer's signaling system 7 outages that were traceable in part to DSC equipment. Pacific Bell, one of the RHCs stung by the outages, signed a

continued on page 18

BT North America plans cell-based POS system

Steven Titch, News Editor

BT North America has begun offering an electronic transaction service using cellular radio channels. The service, which uses special equipment from Cellular Data Inc., is designed to provide merchants with alternatives to leased and dial-up lines for point-of-sale (POS) validation.

"Traditional credit card verification takes 18 to 25 seconds using dial-up lines and 6 to 8 seconds using the more expensive leased lines," said Tom Welsh, manager of electronic transaction service product marketing for BT North America, Washington.

The service is another way users can bypass high telco charges using new, less expensive data services especially tailored to bursty traffic that requires speedy network access.

BT North America demonstrated the service at the recent ComNet show in Washington. Cellular Data will exhibit the equipment this week during the Cellular Telecommunications Industry Association's winter meeting in New Orleans.

The product is expected to attract interest from cellular carriers because it is designed to use the frequency spacing that separates the radio channels carrying cellular phone conversations. Thus, cellular carriers get revenues from resources that previously lay fallow, explains Lee Horsman, Cellular Data director of marketing.

The equipment consists of a credit card reader and a cellular radio terminal for the customer premises and a plug-in card for the cell site that allows it to interface directly with a packet-switched network. BT North America is offering merchants the equipment and service as a package, Welsh said.

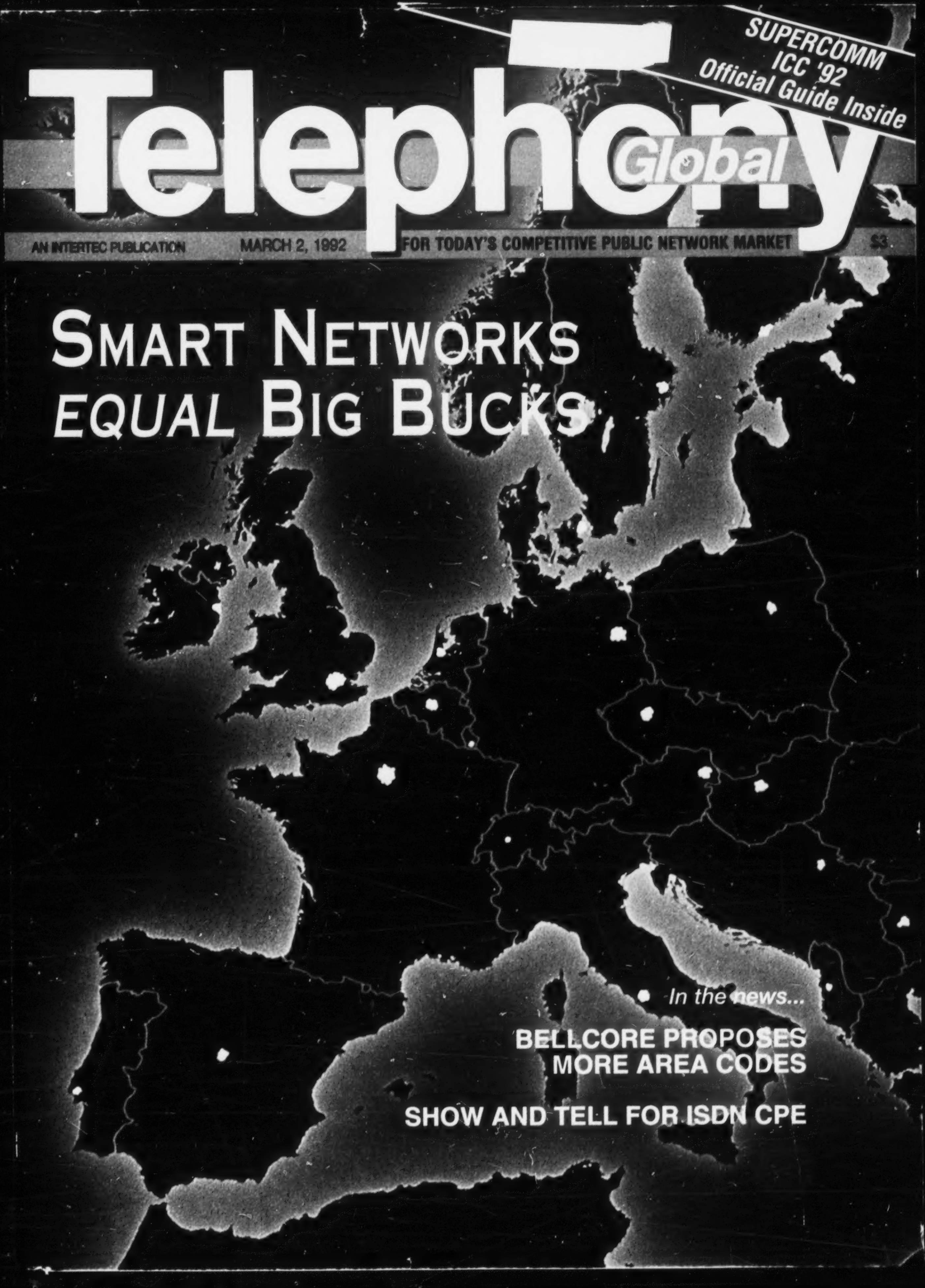
Besides POS credit card validation, the system has applications for remote alarm systems monitoring, remote meter reading and automatic vehicle location, Horsman said. The company recently completed field trials with GTE Mobile Communications and Bell Atlantic Mobile Systems.

BT North America's plan calls for service rollouts in several major cities later this year, Welsh said. The company is holding off until it makes necessary arrangements with a number of carriers in a cross-section of U.S. markets, he added. Pricing has yet to be determined, but Welsh said his company's rates will be competitive, if not less expensive, than private lines from local exchange carriers.

Telephony Global

SUPERCOMM ICC '92 Official Guide Inside

AN INTERTEC PUBLICATION MARCH 2, 1992 FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET $3



SMART NETWORKS *EQUAL* BIG BUCKS

In the news...

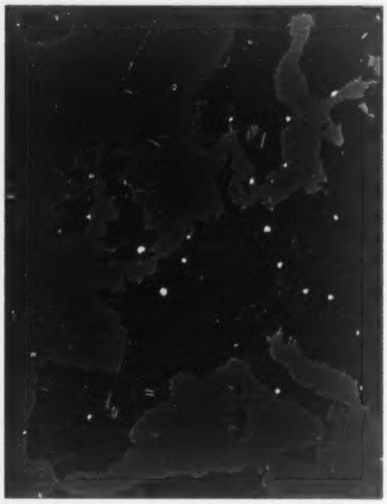
BELLCORE PROPOSES MORE AREA CODES

SHOW AND TELL FOR ISDN CPE

MONDAY, MARCH 2, 1992 Volume 222, No. 9

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET



The intelligent network will dominate the international landscape in the 21st century. Cover art by Terje Kveen, The Image Bank

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NEWS OF THE WEEK

Bellcore proposes 640 new North American area codes

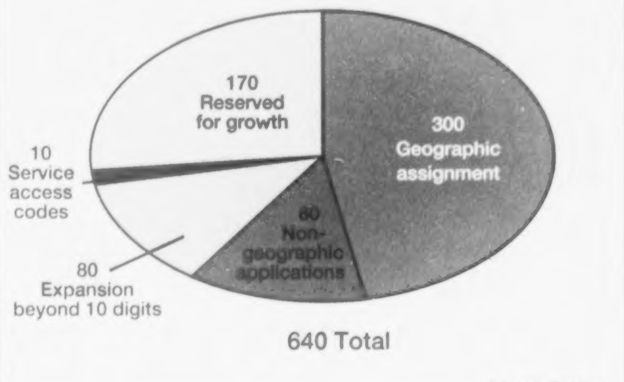
Ann H. Lindstrom, Assistant Editor

Bellcore has gone public with a proposed two-part plan for resuscitating the dwindling supply of area codes in the United States, Canada and the Caribbean, which together make up World Zone 1.

The North American Numbering Plan Administration, the Bellcore agency with government mandate to oversee the creation and allocation of area codes and phone numbers, drafted the proposal to spark industrywide discussion, said Fred Gaechter, member of Bellcore technical staff and author of the plan. The proposal, in the planning process for more than a year, is a response to not only population growth, but the explosive growth of facsimile machines, pagers, cellular phones and other devices, all of which will exhaust the current area code system by July 1995, according to Bellcore estimates *(Telephony, Dec. 24, 1990, page 11)*.

Discussion, however, may not be limited to the plan's merits or shortcomings. Several of the Bell operating companies' competitors have started to question Bellcore's lead role in the administration of the North American Numbering Plan. The topic drew heated comments from MCI Chairman William McGowan at the recent Communication Networks '92 show *(Telephony, Feb. 3, page 12)* and disapproval last week from Royce Holland, president and CEO of Metropolitan Fiber Systems.

PROPOSED ALLOCATION OF 640 NEW INTERCHANGEABLE AREA CODES



Source: Bellcore

"The numbering plan is a national asset, and it shouldn't be a property of the Bell operating companies," said Holland. "We think it's very inappropriate for them to control the numbering system. It's clearly a case of having the fox guarding the hen house."

The proposal is not an NANPA attempt to dictate what should happen, countered Gaechter, who was in Washington, D.C., last week briefing the U.S. Telephone Association's Number Planning Subcommittee on the plan. Should NANPA fail to reach an industrywide consensus on its proposal, the matter will be turned over to the Federal Communications Commission. The FCC oversees all decisions made by NANPA, he added.

The proposal would make available 640 new interchangeable area codes for use beginning in 1995. By then, only two available codes will remain, said Gaechter. The new plan allows the numbers two through nine to be used as the middle digit of an area code, tripling the amount of available codes.

According to the plan, 300 of the 640 new codes would be set aside for assignment to specific geographic areas. An additional 90 codes would be reserved for non-geographic uses, including 80 for personal communications and other services that are not tied to any one territory. Ten codes would be designated for special-purpose service access codes such as 800 or 900 codes. An additional 80 codes would be marked for the ultimate expansion of the NANPA beyond 10 digits and the remaining 170 codes would accomodate growth.

NANPA also recommended creating an advisory council composed of representatives of organizations that speak for companies or governmental bodies affected by the plan.

The plan's long-range goal is to ultimately require uniform 10-digit dialing throughout World Zone 1.

"Ten-digit dialing is not imminent, but it is the goal," said Gaechter.

The document has been sent to more than 3000 telephone companies, manufacturers and government agencies for comments, which are due April 30. If consensus cannot be reached, all of the information will be turned over to the FCC for final consideration.

FCC intervention would be welcomed by at least one BOC competitor.

The FCC ought to designate a neutral agency or contractor to administer a plan, said Holland. NANPA's past performance is not a factor because the potential for abuse will continue to increase as the industry becomes more competitive, he added.

"In the future there will be competitive pressures, and despite how sincere and hardworking and unbiased [NANPA staff is], their organization still is owned by our competitors," said Holland. "I could cite dozens of instances where the Bell operating companies have abused their monopoly. Given their track record for doing anything they can to preserve their monopoly, I wouldn't put it past them in this instance either."

Standards setting for use of the numbers could be slanted against BOC competitors and delays in number assignment or gerrymandering of number allocation are potential abuses, he noted. The assignment of vanity numbers also could harbor potential problems.

Holland has already registered MFS' disapproval of the situation with the FCC and the National Association of Regulatory Utility Commissioners and even broadened its response to include number portability as well.

"Number assignment and number portability are critical issues when creating a level playing field," he said. ■

Confusion Clouds U.S. Telecom Equipment Trade

FRANCIS J. CRONIN, ELISABETH K. COLLERAN and PAUL L. HEBERT

U.S. policy-makers currently are struggling to create a regulatory environment that will best promote U.S. development of internationally competitive telecommunications equipment. Will allowing the Bell operating companies greater freedom to engage in equipment manufacture be ultimately beneficial or detrimental? It is difficult to assess the economic impact of regulatory options when an issue as fundamental as the size of the U.S. telecommunications equipment trade balance (deficit) is in question.

To establish an accurate framework to analyze this situation, a DRI/McGraw-Hill research team focused on developing an accurate and historically consistent definition of the telecom equipment industry and exploring the underlying macroeconomic influences affecting its trade position.

The deficit stood at $2.7 billion in 1989 and did, in fact, improve in 1990, dropping 15%. But it still remains substantial: $2.4 billion in 1990. Furthermore, because it is largely a result of temporary, cyclical macroeconomic factors, this 15% reduction may not actually represent an improvement. In fact, since these factors resumed their normal trend during late 1991, the 1992 deficit could actually exceed its 1989 peak.

The debate surrounding the U.S. Senate's passage last June of the Telecommunications Equipment Research and Manufacturing Competition Act of 1991 signifies the degree to which the international competitiveness of the U.S. telecom equipment industry has become a controversial issue of national priority. There are two fundamental questions: Is the U.S. competitive internationally in telecom equipment and the associated software manufacturing? And, would allowing the BOCs greater freedom to manufacture such equipment promote and protect U.S. competitiveness?

The lack of consensus among reporting agencies and user groups on the actual size of the trade deficit is causing some of the confusion. Figures cited for the 1990 deficit range from $792 million to $2.9 billion, and though all agree that the deficit clearly improved in 1990, sources differ widely on the extent of the improvement. In addition, radically different interpretations of the data have been offered.

Randall L. Tobias, vice chairman of AT&T, has suggested that the 70% decline in the equipment trade deficit from 1988 to 1990 indicates that U.S. products are fully competitive against foreign products.

This statement was in response to an earlier article by Sam Ginn, chairman and CEO of Pacific Telesis, in which he argued that the current trade deficit threatens America's leadership in international commerce.

Measuring the Trade Balance

To construct a complete and accurate industry definition, we examined standard classification systems used by the Census Bureau, the International Trade Administration and the Organization for Economic Cooperation and Development.

These organizations include the four categories that constitute the U.S. Standard Industrial Classification sector 3661 (telephone & telegraph apparatus) in their definitions of telecom equipment: telephones, switching, terminal apparatus and other telegraph apparatus.

Once the definition is extended to consider other equipment—network equipment, communications satellites, TV and radio transmission equipment, and other communications equipment—the consensus among reporting agencies dissolves. The ITA is the broadest, followed by the Census Bureau (which includes TV and radio equipment and other communications equipment) and the OECD (which includes other communications equipment).

Furthermore, these categories are inconsistent. Within the category of other communications, Census includes while ITA excludes: motor vehicle signaling equipment, microphone parts, radio transceivers, TV cameras (exports), camcorders and parts (imports), antennas, TV camera parts, TV apparatus and radio receivers, electrical signaling or traffic control, burglar alarms and smoke detectors. Some of these items belong only peripherally in telecommunications. Camcorder and parts imports accounted for more than $1.7 billion in 1990.

These different definitions result in vastly different reported overall trade balances for telecom equipment (Figure 1).

We used the narrower definition for our study and made two ad-

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justments to account for historical reporting inconsistencies resulting from the U.S. adoption of the harmonized trade classification system in 1989. With regard to imports, we augmented the pre-1989 figures to include cordless handsets in the harmonized definition.

On the export side, however, the effects of harmonization, coupled with classification changes such as the 1987 revision of the SIC codes, make it difficult to construct a consistent historical picture of U.S. telecom equipment trade.

For example, 1989 trade figures appear to reflect a staggering 48% improvement in telecom equipment exports over 1988 levels. This export growth may reflect classification adjustments at the ports following the adoption of more detailed harmonized codes, rather than an actual increase in exports.

FIGURE 1 COMPARISON OF TELECOMMUNICATIONS EQUIPMENT BALANCE OF TRADE (IN MILLIONS OF DOLLARS)

Year	ITA	Census	OECD	SIC 3661	SIC 3661A
1985	(1867)	(1517)	(1267)	(1239)	(1409)
1986	(2031)	(1934)	(1473)	(1253)	(1482)
1987	(2550)	(2558)	(1836)	(1573)	(1931)
1988	(2608)	(2514)	(2106)	(1954)	(2357)
1989	(1935)	(3728)	(1436)	(2425)	(2762)
1990	(712)	(2857)	(994)	(1977)	(2358)

Source: DRI/McGraw-Hill

We adjusted the 1989 and 1990 export figures using "mirror image" import levels as a basis. These adjustments represent the most historically and internationally accurate definition of the telecommunications sector.

Using this definition (SIC 3661A), the U.S. balance of trade in telecom equipment recorded a small surplus ($170 million) in 1982 and turned negative (-$484 million) in 1983. Despite some growth in exports (especially resulting from improved sales of switches and telephone instruments in the mid-1980s), imports continued to flood the U.S. market throughout the decade. While exports increased at a compound annual rate of 15% from 1983 to 1989, imports grew by 30%. By 1989, the telecom equipment trade deficit had reached a record level of $2.8 billion.

In 1990, a 14% increase in exports combined with a 4% decline in imports resulted in a 15% improvement in the equipment trade balance. The deficit, however, remains at $2.4 billion. In spite of the steady increase in telecom equipment exports during the 1980s, the U.S. has barely kept a constant share of the export market; the U.S. share of total OECD exports stood at 12.6% in 1990, the same level as 1981. Only a handful of U.S. industries had worse import penetration. In 1979, imports accounted for $4 out of every $100 of U.S. telecom equipment purchases; by 1990, this figure had grown to $29 out of every $100.

Low-tech items—particularly telephones—are the largest component of telecom equipment imports into the U.S., particularly from Far East producers. Since 1986, supply has shifted rapidly from the newly industrialized countries of Singapore, South Korea and Taiwan—which had an aggregate 1986 import share of 49.9%—toward lower cost producers such as China, Malaysia and Thailand.

Imports of more high-tech switching equipment have experienced a major shift from Japanese dominance to Canada and Western Europe, although Japan continues to dominate U.S. imports of terminal apparatus and facsimile machines.

Overall, Japan accounts for almost 34% of total U.S. imports, down from almost 47% in 1982 (Figure 2). Japan imports only 3% of OECD exports despite nearly 10 years of pressure to open its markets and the fact that Japan accounts for 27% of total OECD exports to the world.

The U.S. has succeeded in penetrating the Japanese market—with $275 million in exports representing the largest share of foreign-produced telecom equipment purchased by Japan in 1990—although the trade deficit with Japan stands at $1.2 billion.

From 1987 to 1990 U.S. telecom equipment exports to Europe more than tripled, exceeding $700 million (close to one-third of total U.S. industry exports). In fact, the U.S. maintains a telecom equipment trade surplus with Europe (more than $500 in 1990), but this surplus does little to offset the $2.5-billion deficit with Japan and other Far East suppliers.

Factors Affecting the Balance

Much of the recent improvement in our trade balance does not reflect improved competitiveness, but is actually the result of macroeconomic conditions and policy choices. Three principal factors affect the trade balance: cyclical macroeconomic effects, structural impacts and pricing effects.

Three economic factors contributed significantly to the telecom trade balance through the 1980s.

Previous DRI studies determined that a direct relationship exists between overall economic activity and telecom equipment purchases. A stronger U.S. economy boosts the demand by U.S. firms for telecom equipment—including imports. Gross national product (GNP) is clearly not the only factor that affects imports; however, holding all other factors constant, DRI's econometric analysis indicates that between 1982 and 1990 a 1% increase in real GNP yielded a 5% increase in real telecom equipment imports.

Our statistical analysis showed that price changes, including exchange rate movements, affect both imports and exports. Price changes have a substantially larger effect on the import side. This is because U.S. imports are mainly low-tech equipment such as tele-

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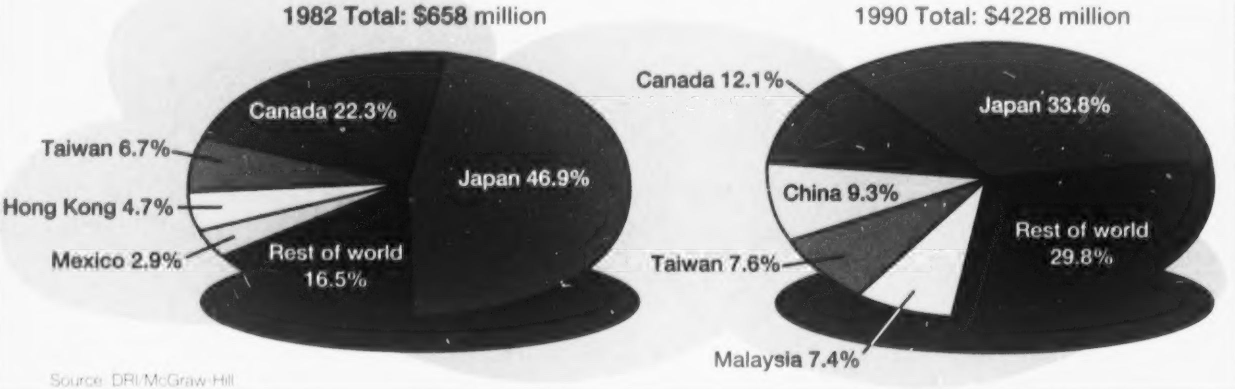
phones, which tend to be price-sensitive; U.S. exports are primarily high-tech equipment such as switching apparatus, which is price-insensitive.

The effect of a depreciation in the dollar is intensified by the relative price sensitivity of exported vs. imported products. The dollar did depreciate: The trade-weighted exchange rate, indexed to 1.00 in 1982, peaked at 1.4 in 1985 and dropped to a 12-year low of 0.865 in 1990.

FIGURE 2 TOTAL U.S. IMPORTS IN 1982 AND 1990


1982 Total: $658 million

1990 Total: $4228 million

Source: DRI/McGraw-Hill

U.S. telecom equipment exports also are positively affected by the level of economic activity in export markets. Of the 16 major trading partners, nine experienced higher growth in 1990 relative to the 1985-1990 average, representing a greater-than-normal demand for U.S. exports.

Ups and Downs

Changes in these economic factors mitigated the trade deficit. Specifically, more than two-thirds of the improvement in the telecom trade balance from 1989 to 1990 was a result of these cyclical changes.

DRI's integrated system of international macroeconomic models was used to project the near-term international economic environment. The projected upswing in the domestic economy will renew U.S. demand for telecom equipment by 1992, increasing imports.

The weak performance of major trading partners (including Canada, the U.K. and Germany) will keep exports stagnant at their current $1.9-billion level. By 1992, with the return to strong growth in imports ($4.9 million), we project the trade deficit for SIC 3661A will once again exceed $2.8 billion.

In analyzing the trade balance for the telecom equipment sector, it is also necessary to account for major policy decisions that have structurally altered the international flow of telecom equipment. After decades of functioning as government-protected monopolies, global telecom providers have evolved into relatively competitive domestic market systems.

Governments, through their own initiative or external pressure, have sought to increase the efficiency of their national telecom systems by relaxing restrictive procurement policies and lifting trade barriers.

Although telecom liberalization began in the early 1980s, and the pace of reform increased throughout the decade, dramatic policy changes in 1989 and 1990 greatly encouraged the flow of American goods into foreign markets. In 1990, U.S. telecom equipment exports to Canada, Mexico, Japan, Taiwan and members of the European Community increased by 53% ($450 million) over 1989 levels.

It is difficult to measure the growth in U.S. telecom equipment exports that is directly attributable to the opening of overseas markets. It should be noted, however, that U.S. exports showed little growth from 1982 to 1986.

Over the next two years major changes in regulations facing world telecom markets will likely be implemented (that is, policy liberalization and European Community harmonization) and trade flows will be more reflective of competitive pricing and quality.

Pricing Effects

Prices can affect the apparent size of the trade deficit dramatically, sometimes obscuring the relationship between dollar sales and units sold. This price effect was particularly noticeable with regard to U.S. imports of fax machines.

The figures indicate a $180-million decline in the value of fax machine imports from 1989 to 1990. But the number of fax machine imports increased by 2%. The resulting decrease in price per unit was largely a function of the depreciation of the yen and does not necessarily reflect a reduced dependence on foreign supply. The analysis of unit imports vs. value indicates that measuring trade exclusively in dollars can lead to faulty conclusions.

Even though the U.S. trade deficit in telecom equipment did decline in 1990, it remains at $2.4 billion. The improvement was largely a result of inconsistent recording procedures, independent macroeconomic variables and structural impacts rather than a sustainable improvement in the industry's competitiveness. If the U.S. is to remain competitive in the international area, policies must be designed based on facts, not fallacies. ■

Francis J. Cronin is Managing Director of DRI/McGraw-Hill, Lexington, Mass. Elisabeth K. Colleran and Paul L. Hebert are Senior Associates at the company.

Telephony

AN INTERTEC PUBLICATION MARCH 23, 1992 FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET $3

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Building bridges to the network of the future

In the news...

SPREAD SPECTRUM TECHNIQUES GET HEARING

NEW FACES BRING NEW IDEAS TO LECs

MONDAY, MARCH 23, 1992 Volume 222, No. 12

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

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BUILDING BRIDGES TO THE NETWORK OF THE FUTURE
By Bob Conroy. Originally designed to eliminate back-to-back channel banks, digital cross-connect systems have become the workhorses of telecommunications networks worldwide. They will remain well-positioned to help the network cross over the SONET bridge
Cover art by Deborah Zajac, courtesy of Tellabs

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But marketers from competitive consumer industries often get a wary greeting from lifelong telco employees

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The CATV company and the cellular giant team up for a residential test in Ashland, Ore., using both the local cellular and cable TV infrastructure

IBM, NORTHERN TO MARKET COMPUTER-CO LINK 9
The interface will offer computer networking power to telemarketing operators, security agencies and other professionals

BAMS: ONE NUMBER, ANY LOCATION 13
Although not the intelligent network-based "follow-me" service ultimately envisioned, Bell Atlantic Mobile Systems' new service allows cellular customers to direct calls to voice mail, home, office and other numbers

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Lubricant can ease the headaches of cable-placing technicians when removing cable from conduit

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Three companies vie for CTIA endorsement

Ann H. Lindstrom, Assistant Editor

While politicians battled for votes in the Illinois primary last Tuesday, Qualcomm Inc., Ericsson Radio Systems and SCS Mobilecom Inc. spent the day in Rosemont, Ill., stumping for support for their wideband/spread spectrum options for second generation digital cellular systems.

More than 100 people attended the first of three scheduled open technology forums, sponsored by the Cellular Telecommunications Industry Association. The forums will help CTIA determine which option, if any, it will encourage the Telecommunications Industry Association's TR45.5 wideband/spread spectrum standards committee to pursue, said Bruce DeMaeyer, Ameritech Mobile Communications president and CTIA's wideband/spread spectrum committee chairman. The TR45.5 subcommittee will meet for the first time in Dallas on March 30.

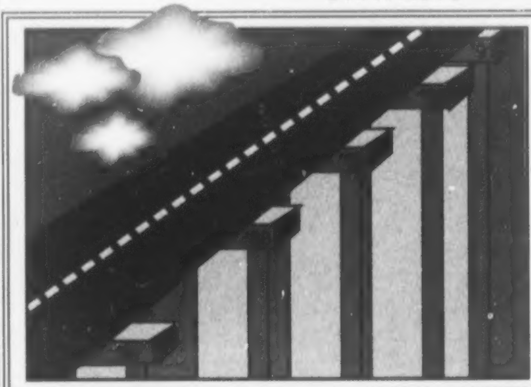
"This forum gives everybody a chance to hear the proposals and to smoke out potential weaknesses," said DeMaeyer. "There are a lot of people here asking questions that the CTIA subcommittee may never have thought about."

To be eligible for consideration, proposed technologies had to offer a tenfold increase over analog system capacity, privacy, long life and an adequate growth cycle, and an ability to introduce new features and quality improvements. The systems also needed to allow for easy transition to digital, be available early and at reasonable costs, and be based on Cellular Open Network Architecture.

"Qualcomm's direct sequence-CDMA (DS-CDMA) is the long-term solution for the cellular industry," said Irwin Jacobs, president and CEO of the San Diego-based company. "It will provide for true personal communication systems in the cellular frequency band."

DS-CDMA operates using 1.25-MHz spreading bandwidth and increases cellular network capacity up to 20 times that of analog systems, he noted. It features soft handoffs, universal frequency reuse, a shared pilot on the forward channel and a variable rate voice-operated coder.

CTIA FACTS



Cellular industry grew 43% in 1991, adding 2.3 million subscribers in 12 months

GROWTH FIGURES

Dec. 1987- 1,230,855
Dec. 1988- 2,069,441
Dec. 1989- 3,508,944
Dec. 1990- 5,283,055
Dec. 1991- 7,557,148

Source: CTIA

Average monthly bill and average call length		
1987	$96.83	2.33 minutes
1988	$98.02	2.26 minutes
1989	$89.30	2.48 minutes
1990	$80.90	2.20 minutes
1991	$72.74	2.38 minutes

Source: CTIA

"With 1.25 MHz you get very good diversity and voice quality that you don't get with the other systems," said Jacobs in support of his system.

Even though Ericsson Radio Systems makes first generation digital cellular time division multiple access (TDMA) equipment, the company proposed two wideband/spread spectrum options—frequency hopping multiple access (FHMA) and CDMA with interference canceling (CDMA-IC).

However, wideband digital cellular will only be needed if and when there is a market for wideband services, said Jan Uddenfeldt, vice president and general manager-research and development, during his presentation. Within the next two years, he said, TDMA will evolve to accommodate up to 10 times the capacity of analog systems, and future technologies stand to gain from feedback regarding first generation implementation.

With FHMA, each carrier bandwidth is 210 kHz and all frequencies are reused at every cell, said Uddenfeldt. Also, there is no interference between users in the same cell. FHMA will be able to accommodate up to 15 times the capacity of analog systems, he added.

CDMA-IC incorporates 210-kHz spacing and involves cancellation of interferers within the same cell and between cells. The technology offers a capacity increase of up to 65 times that of analog systems.

Unlike the other proposals, SCS Mobilecom's option would initially work as an overlay network placed on top of existing TDMA or analog networks. Broadband spread spectrum CDMA (B-CDMA) operates in the 1850-MHz to 1990-MHz band and occupies 48 MHz of bandwidth. B-CDMA realizes its greatest gains when it is not used as an overlay network—from 10 times to 25 times the capacity of analog systems.

B-CDMA, however, offers nominal gains when placed over analog or TDMA sytems, but it allows a provider to add capacity without taking existing users off, said Don Schilling, president of the Port Washington, N.Y., company.

"Some service providers will not accept the CDMA standard; they want to go to TDMA," said Schilling. "Because I can overlay B-CDMA on top of their TDMA, I have a sure market. I don't have to kick anyone off to get some market share. The others are talking about kicking off 10% of the users, who will be unhappy."

Those who presented proposals last week have until the next forum on April 14 to answer more detailed questions, which CTIA will funnel to the companies from inquirers until then, said DeMaeyer. A third forum will be held only if necessary.

TCI, McCaw team for PCS

Charles F. Mason, East Coast Bureau Chief

Tele-Communications Inc., one of the country's top cable TV providers, has made another bid to enter the local exchange business. The company disclosed last week that it is joining with McCaw Cellular Communications to test a residential personal communication system (PCS) in Ashland, Ore. The companies plan to use their respective CATV and cellular networks to support the trial.

The six-month test will involve portable phones and provide 200 customers with communications capabilities both in and out of the home, according to the companies. Four low-power microcells operating on cellular frequencies have been installed in Ashland.

The microcells are interconnected with McCaw's cellular system in the city via TCI's fiber optic cables. Customers will be able to choose conventional cellular service outside of the range of the microcells.

The trial is the first of its kind in the U.S. to sell a combined residential and local wireless service to the public, McCaw said.

"This is an exciting test of wireless and cable technologies and provides us a chance to gather some vital information from customers," said Craig McCaw, chairman and CEO of McCaw.

Many within the cellular and CATV industries are eager to offer PCS. The move by TCI is but one of several recent business decisions to become an aggressive entrant in telecommunications.

Last month, for example, TCI and Cox Enterprises announced they were taking over Teleport Communications Corp., a competitive access provider with operations in several top cities, including New York *(Telephony, Feb. 24, page 8)*. The decision was seen by industry observers as another step toward placing the CATV industry into position to offer a range of new communications services, including PCS. Both companies, along with other CATV operators, have received experimental licenses from the Federal Communications Commission for PCS trials.

IBM readies CallPath-CO link

Charles F. Mason
East Coast Bureau Chief

IBM will connect its CallPath computer/telephone system interconnection product line to Northern Telecom's DMS-100 central office switch. This is the first CallPath link to a CO switch and comes almost 18 months after a trial announced in 1990 between IBM, Nynex, Northern Telecom and Syracuse University *(Telephony, Nov. 12, 1990, page 11)*.

"This means that customers will no longer need their own PBX to take advantage of the features offered by CallPath," said Dan McIntyre, director of networking and voice solutions marketing for IBM, during a press conference last week.

The CallPath-CO link is facilitated by a special switch-to-computer

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Telcos refocus on marketing with fresh faces and fresh ideas

A welcome mat or a wary eye?

Richard Karpinski, Assistant Editor

TELEFOCUS

Nancy Pitz had, in her own words, "the mechanical aptitude of an earthworm," when she was named to the top marketing post at Centel Corp.'s Central Telephone Co. a year and a half ago.

Fresh from a 20-year stint in marketing at Quaker Oats—where she mainly helped sell cereal and dog food—Pitz didn't know POTS from an AIN from an ISDN.

"I had never worked in an industry with such acronyms," she recalls. "I sort of felt like I'd landed in Russia and didn't speak the language."

Yet today, Pitz has helped instill a marketing savvy that enables Centel to better develop and sell emerging services such as custom local area signaling services (CLASS). The key was not what she didn't know—technology—but what she did know—marketing in a competitive, consumer-oriented environment.

"There's a real tendency in this industry, because people have such long tenure and such detailed knowledge of the business, to give [technology] a level of importance that the customer doesn't share," Pitz says. "Somebody's got to bridge that and make it easier for the customer. I think that's the biggest thing I bring to Centel."

Centel executives clearly believe you can never have too much of a good thing: About the same time Pitz was hired, Michael Connelly, also from

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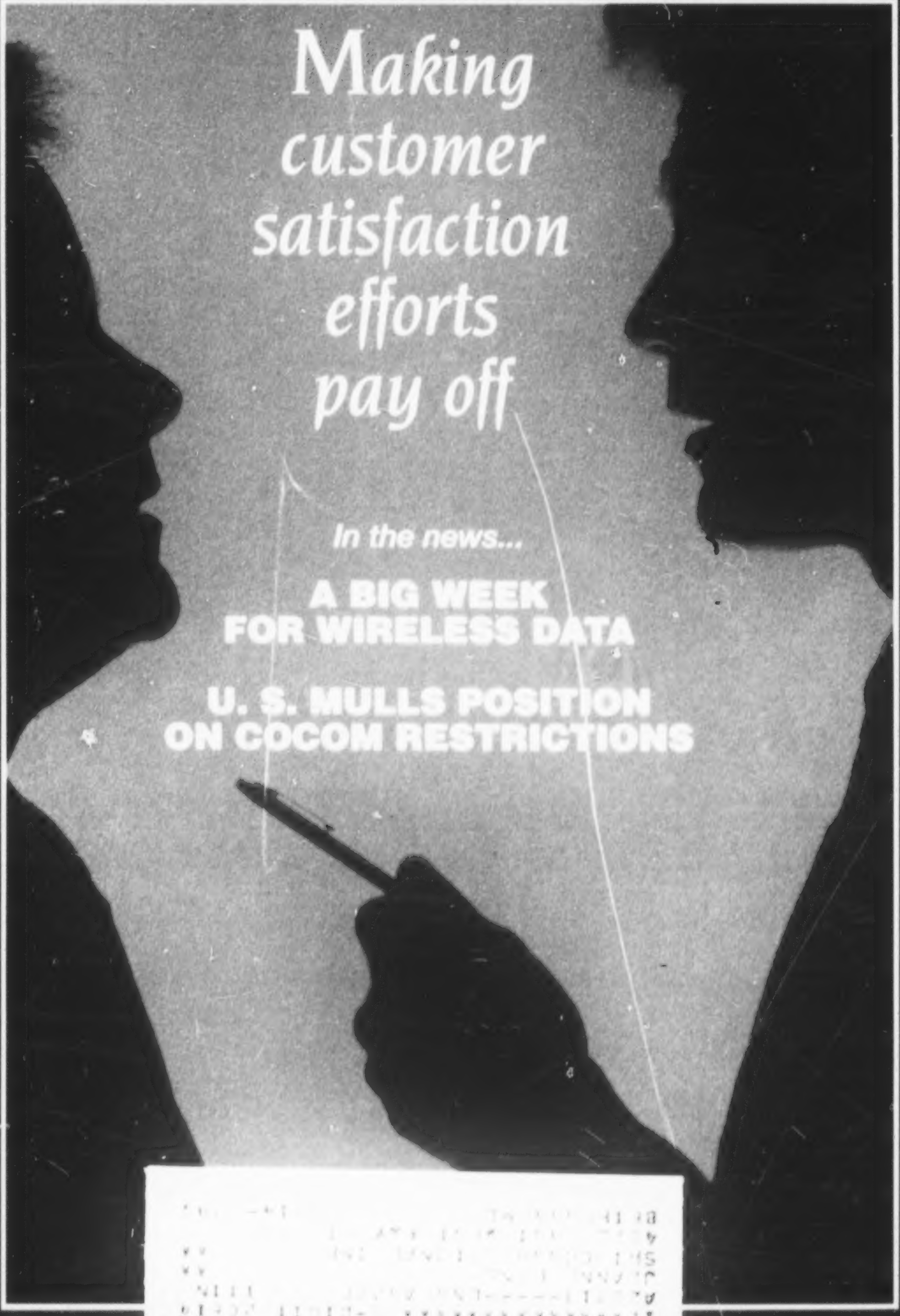
AN INTERTEC PUBLICATION MARCH 30, 1992 FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET $3



Making customer satisfaction efforts pay off

In the news...

A BIG WEEK FOR WIRELESS DATA

U. S. MULLS POSITION ON COCOM RESTRICTIONS

MONDAY, MARCH 30, 1992 Volume 222, No. 13

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

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MAKING CUSTOMER SATISFACTION EFFORTS PAY OFF
By Dan Finkelman, Rich Cetlin and David Wenner. A satisfied customer isn't necessarily a loyal one. Telcos need to figure out how to transform their existing customer base into extremely satisfied customers—ones that won't change allegiances
Cover photo by Comstock

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By Carol Wilson. Although recessions typically cause trade show attendance to ebb, WAVE '92 boasted high tides of both attendees and new technologies 40

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Data communications moves to the forefront of cellular

Charles F. Mason, East Coast Bureau Chief

With data transmission increasingly seen as the next frontier for cellular, five major carriers disclosed last week that they are kicking off a joint venture designed to explore and exploit that market.

Ameritech Mobile Communications, Bell Atlantic Mobile Systems, GTE-owned Contel Cellular, GTE Mobilnet and Nynex Mobile Communications signed a letter of intent to develop joint plans aimed at launching data communications services over their cellular networks.

In February, the same group of carriers said they would cooperate to form a "seamless" cellular network and establish a common national brand identity that would challenge Cellular One, the partnership of McCaw Cellular Communications and Southwestern Bell *(Telephony, Feb. 17, page 8)*.

Wireless data was big news elsewhere as well last week. McCaw appears on the verge of announcing that it will equip its cellular network to handle data communications, with help from IBM, according to published reports.

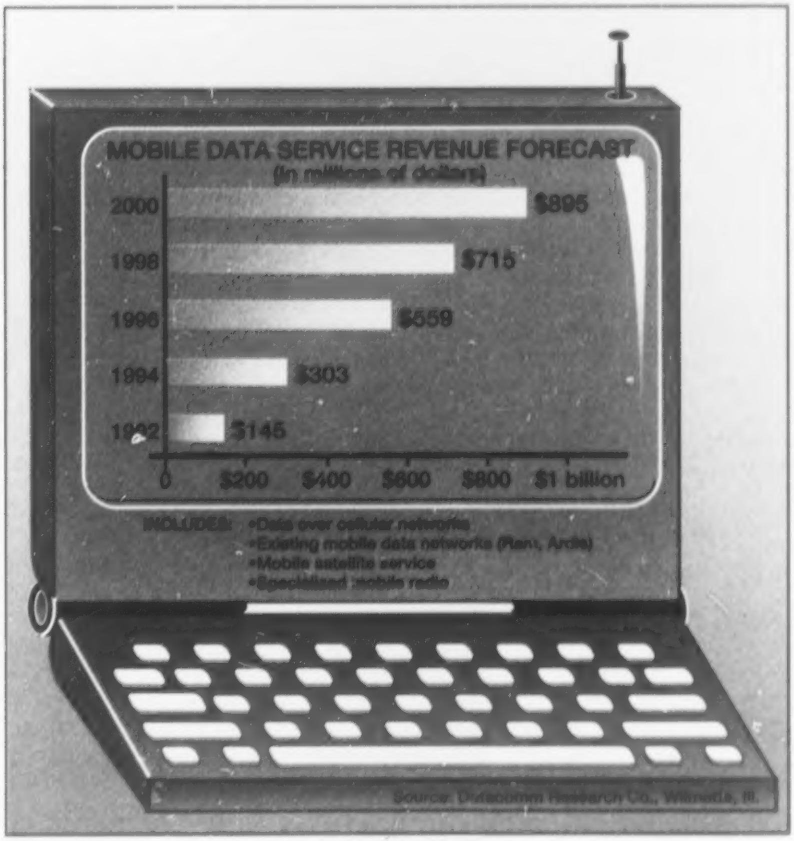
Meanwhile, Motorola said it would open up for the first time its Ardis wireless packet data network and related technologies to cellular carriers and vendors (see story below). BellSouth cut a deal to sell IBM's cellular portable data terminal, the PCradio (see story on page 9). And PacTel Cellular firmed up its recently created wireless data division, naming Lee Franklin, most recently a consultant to the company on code division multiple access, to head up the unit.

"This is the beginning of the snowball," said Ben Holcomb, president of BellSouth subsidiary American Cellular, of the spate of wireless data announcements.

Leading the wireless data snowball down the hill last week was the five-member local exchange carrier group. The group, which now appears locked in head-to-head competition with Cellular One, currently serves a market totaling 120 million people in 128 major cities and 69 rural service areas.

The move by the five carriers "is a signal to infrastructure and computer manufacturers that we are moving to offer these services" and want an open standards-setting process for equipment, said Bruce DeMaeyer, president of Ameritech Mobile.

That should lead companies like Apple and Compaq Computer to develop the necessary customer premises equipment for the network, DeMaeyer said. In addition, other carriers must become part of the pro-



Source: Datacomm Research Co., Wilmette, Ill.

Motorola opens Ardis protocols

Charles F. Mason
East Coast Bureau Chief

Capitalizing on the growing need for wireless data transmission services, Motorola said last week it will open up the protocols used in its Ardis data network and work with U.S. cellular carriers to develop an open protocol packet data system.

The shift to open protocols means that equipment vendors will be able to manufacture compatible terminals and modems for use with Ardis. Up until now, only Motorola could produce compatible equipment because of the proprietary technology.

The company's work with cellular carriers will include participation in efforts to help the industry converge standards on open, over-the-air protocols, interLATA communications and network administration, it said.

"This is a brilliant move," said Herschel Shosteck, president of Herschel Shosteck Associates, a market research firm. "It's a win, win, win situation for everyone."

ter and dust, was designed with the modern mobile work force—including both blue collar field technicians and professionals such as sales representatives—in mind, said Dennis McCurdy, senior product planner of IBM's mobile work force competency center, Boca Raton, Fla.

Although IBM has been working with mobile data systems for more than five years, the BellSouth deal represents its first foray into customer equipment that works with the public cellular network. The company is pursuing similar arrangements with other carriers, according to George Gordon, marketing development market representive of the communications industry at IBM, citing that, while IBM knows data, the carriers understand public switched networking. ▪

Tekelec's Eagle lands at Allnet

Ann H. Lindstrom, Assistant Editor

When Tekelec discovered that some of its customers were using its MGTS signaling system 7 protocol testers as signal transfer points (STPs), the company decided it was time to tackle the network products market, according to Robert Hess, vice president and director of business development.

More SS7 news on page 14

Tekelec's new Network Products Group recently unveiled its Eagle STP/1 Open Signalling Access switching platform for SS7 and Advanced Intelligent Networks. The first mated pair of Eagle STP/1s was purchased by Allnet Communications Sevices Inc. for $2.1 million. Allnet, Bingham Farms, Mich., provides domestic and international long-distance service.

Allnet will use the Tekelec gear to replace two DSC Communications Corp. first generation MXB STPs, said Steve Fernald, vice president of engineering at Allnet. The STPs will support SS7 between Allnet's 16 service switching points and provide links to all major Bell operating company LATAs.

"We are getting heavily into SS7 interconnection with the local exchange carriers so we are completely rebuilding our SS7 network," said Fernald. "We are also interested in providing hubbing service for other carriers in the future."

Allnet chose the Eagle STP/1 because its SS7 addressable Ethernet port will accommodate a general-purpose computer, which can be used to do specialized translations needed to provide customized features and products, said Fernald.

Tekelec's Network Products Group, headquartered in Raleigh, N.C., also plans to offer a signal point interface based on the Eagle platform that can be used by database suppliers entering the SS7 signal control point (SCP) market or as an access solution for switch manufacturers that need an SS7 interface to the network, said Hess.

"The main obstacle for companies getting into the SCP business has been the SS7 front end. We want to offer a generic product that allows enhanced service providers and integrators to use any Unix platform as an SCP," he added.

Tekelec is targeting its new products for Independents, interexchange carriers and cellular network providers. There are no STPs used in cellular today, yet the network topology is moving that way for the future, said Hess. Tekelec expects the Eagle market to reach $400 million by 1997.

"A number of Independents believe that having their own SS7 network is out of their price range. The Eagle STP/1 is less expensive to get into and own, and it grows smoothly from

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What's next in local loop competition?

With market shares still dwindling below 1%, the competitive access provider (CAP) industry's bark remains worse than its bite.

But local exchange industry beware: The elements are in place for the CAP industry to begin making a bigger dent in local loop revenues, according to Mark Lowenstein, senior telecommunications consultant with Boston-based Yankee Group and author of a recently released white paper on loop competition.

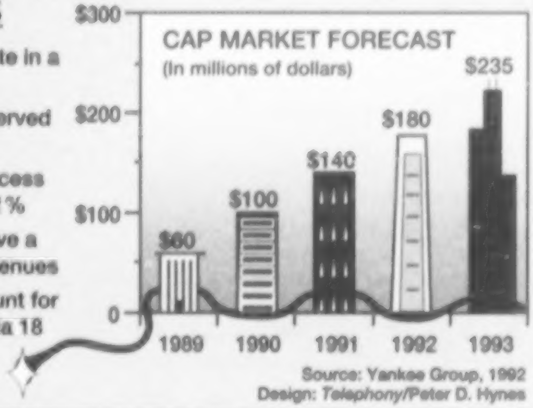
The key driver of change, said Lowenstein, may be the emerging involvement of cable TV companies, such as the recent acquisition of Teleport Communications by Tele-Communications Inc. and Cox Enterprises. A company consisting of Teleport and Digital Direct, TCI's existing CAP operation, could quickly become a $200-million firm operating in as many as 25 cities, Lowenstein reported.

The next likely step, said Lowenstein, would be for one or two of the larger CAPs—Teleport and Metropolitan Fiber Systems would be leading candidates—to team with an interexchange carrier to offer one-stop shopping arrangements, including common pricing, volume discounts and marketing end-to-end solutions.

Such a scenario could give CAPs a distinct advantage over local exchange carriers and position them to offer high-bandwidth applications such as local area network interconnection, videoconferencing and image networking on a multicity basis.

CAP FACTS

- **32 different CAPs operate in a total of 32 cities**
- **50% of CAP cities are served by more than one CAP**
- **CAP share of special access revenues still less than 1%**
- **Cable TV companies have a hand in 50% of CAP revenues**
- **MFS and Teleport account for 50% of CAP revenues via 18 networks**



Source: Yankee Group, 1992
Design: Telephony/Peter D. Hynes

SUPERCOMM '92
Program Update Inside

Telephony Global

AN INTERTEC PUBLICATION APRIL 6, 1992 FO MPETITIVE PUBLIC NETWORK MARKET $3

GSM bids for global recognition

In the news...

TELECOM FREE TRADE GETS A CLOSER LOOK

PRIVATIZATION MEANS CHANGES IN MEXICO

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GSM BIDS FOR GLOBAL RECOGNITION
By John Williamson. In a crowded cellular world, GSM may be the closest digital cellular standard to hitting the commercial market, despite its delays in getting there. Even so, that doesn't necessarily mean the European standard will dominate the globe and choke out the other two major cellular options
Cover illustration by Laura M. Doyle

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A proposal for local exchange competition draws both enthusiasm and doubt from the industry

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LECs are using the latest computer systems to provide front-line managers with the tools to be more customer-focused

FRAME RELAY: PUBLIC AND PRIVATE 9
Pacific Bell teams with StrataCom and Northern Telecom to test a hybrid network for Covia, the travel reservation system owned by seven airlines

PRIVATIZATION IN MEXICO CHANGES THE RULES 12
LM Ericsson finds its position as chief vendor to Telmex at risk as the newly privatized company opens procurement to unprecedented competition

PACIFIC BELL PLANS LINK WITH CATV NETWORK 18
The California LEC and South Sutter Cable Inc. will build a fiber-to-the-curb system and a CATV network that will serve 55,000 homes

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U.S. FIRMS RING UP SALES IN BRAZIL 25
By Anne C. Dibble. Deregulation has hit Brazil's telecom market, and U.S. firms are celebrating. They finally have a chance to participate in a market that has been touted as the world's best telecom investment

PERSPECTIVES 56
By Steven Titch. It's just a matter of time before there's a rumble between cable TV and LEC interests. Both sides might be better served to just cooperate with each other

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Telecommunications deregulation in Brazil rings up sales for U.S. firms

ANNE C. DIBBLE

Brazil's telecommunications market is once again open for business. After decades of protecting domestic telecommunications companies against international competition, Brazil is now rolling out the red carpet for foreign firms that want to help upgrade the country's antiquated telephone network. It is good news for American companies, which have long recognized Brazil's market potential as the world's 10th largest economy and 15th largest telecom network.

Brazilian President Fernando Collor is attracting new investment through an ambitious deregulation program aimed at injecting competition into key segments of the services and equipment markets. Plans are also under way to privatize the 58% government-owned state telecom holding company, Telebras, pending congressional approval of a constitutional amendment that would permit private ownership of public utilities.

A Deregulation Showcase

With 9 million lines installed in 1991, Brazil's public network is the largest in Latin America. Its telex network, linking 129,000 terminals, is the world's fifth largest.

Telebras is the jewel of Brazil's 200 state enterprises and by far its most lucrative. The privatization of Telebras and telecom liberalization are viewed by the Collor administration as spurs to network modernization and a means to fuel growth after more than a decade of stagnation and hyperinflation.

President Collor created the National Communications Secretariat (SECOM) to oversee the liberalization process, streamline the country's 28 local telcos into seven regional organizations, and implement a more realistic tariff structure through a three-year rate rebalancing plan.

Under Collor's predecessor, only the data communications sector had been partially deregulated in 1988, when local telcos were allowed to offer data services to compete with Embratel, the company responsible for long-distance and international voice, data, telex and maritime services.

Since Collor took office in March 1990, SECOM has sanctioned almost a dozen directives to foster competition in "limited" services not defined as part of the public network. The most important directive, approved last July, opened the cellular telephony, paging, private data communications and satellite markets. Private companies were also authorized to bid on the construction and installation of telephone networks, ranging from subscriber-financed projects to fiber optic systems.

Once constructed, these networks will continue to be managed by public phone operators, which also retained the right to explore limited services in competition with private companies. Value-added networks, now approved by the Special Secretariat for Informatics on a case-by-case basis, are expected to be liberalized soon.

U.S. officials are understandably delighted with the change in Brazil's policy. Ambassador Bradley Holmes, director of the State Department's Bureau of International Communications and Information Policy, predicts that the measures will provide new opportunities in Brazil's $3.2-billion telecom market for U.S. companies and joint ventures between companies in Brazil and the U.S.

To ensure that the deregulation process proceeds smoothly, Collor's economic team has been receiving technical assistance since last July from the Bush adminis-

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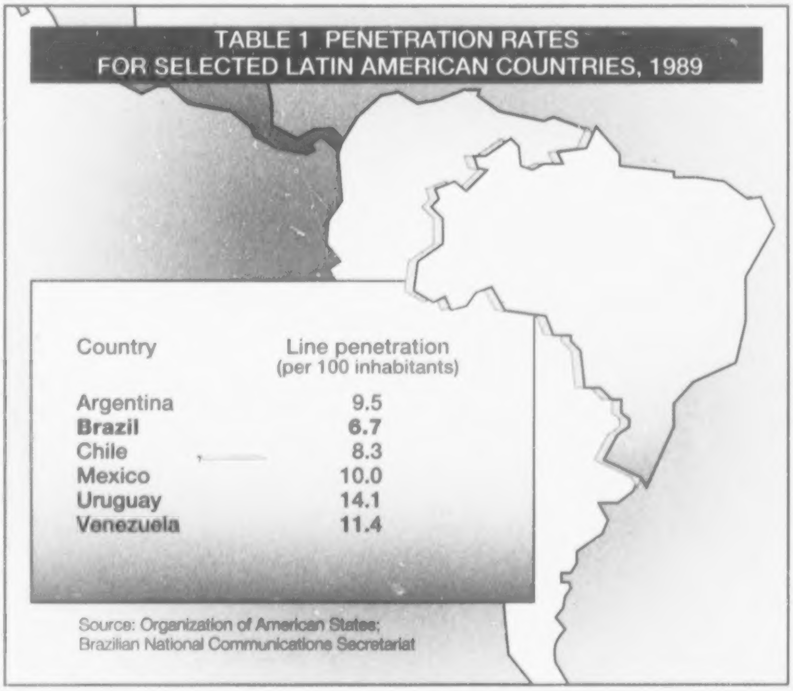

TABLE 1 PENETRATION RATES FOR SELECTED LATIN AMERICAN COUNTRIES, 1989

Country	Line penetration (per 100 inhabitants)
Argentina	9.5
Brazil	**6.7**
Chile	8.3
Mexico	10.0
Uruguay	14.1
Venezuela	11.4

Source: Organization of American States; Brazilian National Communications Secretariat

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tration and U.S. telecom firms. Ironically, many of these firms were forced to leave Brazil in the 1970s when foreign companies were banned from manufacturing or importing electronic equipment. Foreign companies that remained in Brazil such as NEC, Ericsson and Siemens transferred sensitive technology and managerial control to local partners in exchange for a guaranteed lock on government procurement of higher-end switching equipment. The lower end of this $1-billion market was reserved for local manufacturers.

"The highly protectionist model of the last 20 years has truly exhausted its effectiveness," Brazilian Communications Secretary Joel Rauber declared during a July 1991 conference in Washington, D.C., sponsored by the U.S. State Department as the first of regular bilateral discussions on technology, policy, regulation and trade in communications. More than 60 U.S. high-tech companies, including giants like the Bell regional holding companies, AT&T, Motorola, Hughes and IBM, were present at the conference to assess investment and joint venture opportunities.

The Bush and Collor administrations are making telecommunications in bilateral economic relations a high priority because the sector offers the most short-term growth in new money investment.

Brazil's network, which compared favorably to European networks in the 1970s, has suffered as a result of chronic underinvestment since the early 1980s. Today, Brazil's phone penetration rate of 6.7 per 100 inhabitants is among the lowest in Latin America (Table 1). Telebras officials estimate that $6 billion in new investments is needed to meet demand, now estimated at 6.5 million new lines.

According to U.S. Department of Commerce analyst Patricia Cooper, real demand is considerably higher, evidenced by a bustling black market for phone lines in Brazil's major metropolitan areas. In Rio de Janeiro alone, more than 2000 phones are sold monthly on the underground market by speculators at premium prices. For the 600,000 subscribers who have already paid the official rate of $3000 for a phone line, installation can take up to two years in densely populated cities.

Consumer frustration has been further exacerbated by declining network quality and rising rates. In 1990, only 76% of long-distance calls were completed on the first attempt, down from 94% in 1980. In exchange for poor service, Brazilians now pay some of the highest tariffs in the world. International calls averaged $2.90 per minute in 1991, and domestic long-distance charges were recently hiked 100% to keep up with the double-digit monthly inflation.

Brazil's self-imposed technological isolation over the past 20 years has also slowed network modernization. As of 1990, only 7% of the public network had been upgraded to digital technology. To counteract this situation, the government plans to digitize 80% of the public network by the year 2000 and should complete a pilot integrated services digital network program by the end of this year.

Despite these goals, the unavailability of advanced services, combined with deteriorating network quality and high rates, has clearly hurt Brazil's competitiveness as a foreign investment site. At a June 1991 conference, Brazilian officials admitted that poor telecommunications played a major role in General Motors' decision to transfer its Latin American headquarters from Sao Paulo to Miami.

But General Motors may have moved too soon, if industry response to the deregulation program is any indication. Communications equipment sales topped $2 billion for the first time in 1991, and orders are poised to grow by 40% in 1992.

Telecom services also are expanding briskly, fueled by triple-digit growth in international phone traffic—111% in 1990 alone—as companies begin to take advantage of the new deregulated environment for private data communications services and international value-added networks. Based on these trends, Brazilian telecom executives estimate that between $5 billion and $6 billion in new systems investment is needed over the next five years to meet demand for new services that could generate annual billings of $20 billion by the year 2000.

TABLE 2 U. S. PARTICIPATION IN BRAZILIAN CELLULAR CONSORTIA

1. **Motorola**, Unibanco, Equitel, Construtora Norberto Odebrecht

2. **AT&T, Ameritech**, Sid Telecomunicacoes, Construtora OAS

3. **BellSouth**, Banco Arbi, Grupo RBS, NTT, Banco Safra, Banco Iochpe

4. **Bell Atlantic**, Organizacoes Globo, Camargo Correa, NEC, Bradesco, Stet, Monteiro Aranha (Ericsson)

5. **GTE**, Andrade Gutierrez, Banco Icatu

Investment Opportunities

U.S. firms are being courted by the Brazilian government precisely because they have the enormous amounts of capital and sophisticated technology Brazil needs. According to Salomao Wajnberg, SECOM's director of industrial and technology policy, U.S. investment is also being encouraged to promote greater equilibrium in the imported equipment market, which is currently dominated by the Brazilian subsidiaries of NEC,

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Ericsson and Siemens. Imports now account for 30% of Brazil's $3.2-billion equipment market, with the remainder supplied by approximately 150 local manufacturers, 17 of which are affiliated with multinationals.

U.S. firms are being enticed into Brazil by the possibility of owning up to 49% of non-voting stock in Brazilian telecom and computer companies, as decreed in a new informatics law that will take effect in October. But preference will still be given to Brazilian companies in government equipment procurement bids particularly in the switching equipment market, where Brazil now deploys an indigenous switching system, TROPICO, that was developed with Canada's Northern Telecom.

According to SECOM's Wajnberg, local manufacturers will no longer be automatically favored in government procurement policies and will have to compete with foreign manufacturers for contract bids on the basis of quality, price and delivery terms—even in the protected switching market. As evidence of this change, Wajnberg cited Embratel's May 1991 decision to award a $20-million international switching system contract to a consortium led by AT&T.

The best opportunities in Brazil's equipment market await U.S. firms in areas where American technology and expertise remain strong—such as the satellite, fiber optic, trunking, paging, cellular, value-added and data communications equipment sectors. In the paging market, for example, giant Motorola and the smaller Skytel have both linked up with local partners to win paging licenses in major Brazilian cities.

U.S. firms can also bid on network construction and installation projects. Although American companies must team with local firms to participate, there are no equipment import restrictions. Cooper, of the U.S. Department of Commerce, says Brazil's cash-strapped local telcos are supporting private network construction to reduce the nation's 1 million backlog of subscribers without phones.

Telcos have already ordered 500,000 new lines under the low-budget, subscriber-financed condominium construction program, 66% of which will be fiber. If the initial phase of the program is successful, the government will rely exclusively on private contracts to meet its national target of 25 million lines installed by the year 2000.

To speed deployment of fiber optic networks, Embratel is tendering bids for cable projects to link major Brazilian cities and transmit enhanced ISDN services. Although Brazil currently protects its two domestic fiber optic manufacturers with a steep 50% tariff, the government will purchase imported fiber when domestic quality or quantity is lacking. AT&T is banking on that loophole to beat out the Brazilian subsidiaries of Ericsson, NEC and Siemens in a bid to construct a $40-million fiber optic cable between Rio de Janeiro and Sao Paulo that will provide advanced 800, automated telecard and other ISDN services beginning in 1993.

> *U.S. firms are being enticed into Brazil by the possibility of owning up to 49% of non-voting stock in Brazilian telecom and computer companies....*

Embratel is also planning to connect Belo Horizonte, Rio de Janeiro, Sao Paulo and Brasilia with fiber optics, and lay southern and northeastern cable to cover the rest of the country. To complement the country's internal fiber network and increase capacity for U.S.-Brazil telecommunications traffic, Embratel is investing $140 million in a new undersea cable stretching from Brazil's Atlantic coast to AT&T's TCS-1 cable in the Caribbean. Although the deal was signed between Embratel and AT&T, MCI and Sprint will also participate, together with telcos from Canada, Latin America, Europe and the Far East.

Brazil's cellular market has been the most hotly disputed among U.S. firms and their international competitors, all of which are anxious for a piece of that estimated $4.5-billion market. NEC do Brasil and Northern Telecom were the big winners of tenders issued by SECOM in 1990 to install private cellular networks in Rio de Janeiro and Brasilia in conjunction with domestic companies and local operators. Some 4000 subscribers have signed up in Rio at an initial cost of $6000 to $8000 per line, and local telco officials are projecting that there will be 10,000 subscribers by 1994. Prices per new line now hover around $3500 and are dropping fast as demand increases.

Five other cellular networks are expected to go on-line between now and 1993 in Sao Paulo, Curitiba, Porto Alegre, Belo Horizonte and Salvador. Based on surveys done by Telebras in these and other cities, national demand for cellular service could reach 500,000 terminals over the next few years, and could eventually replace regular service in sparsely populated areas. Some 300,000 of these subscribers are located in greater metropolitan Sao Paulo, responsible for 60% of all telephone traffic and 70% of all data traffic in Brazil. Little wonder that Brazilian Infrastructure Minister Joao Santana has called Sao Paulo "the last great potential cellular market" in the world.

American companies clearly agree with Santana's assessment. AT&T, Motorola, GTE, Bell Atlantic, Ameritech and BellSouth have all joined forces with powerful Brazilian financial, communications and construction groups to dispute the right to initially install 25,000 lines in Sao Paulo (Table 2). With a potential subscriber base of 100,000 customers, analysts estimate that Sao Paulo could generate $1 billion in equipment and line sales alone. In Brazil's southern region, AT&T, Motorola and BellSouth are squaring off against foreign powerhouses like NEC, Ericsson and Northern Telecom for the right to construct cellular systems in Curitiba and Porto Alegre.

Brazil's booming data communications market is also attracting U.S. corporations. Most data transmission in Brazil is now handled by Embratel in conjunction with Sprint International, al-

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though Embratel recently joined AT&T to provide dedicated line service between the U.S. and Brazil at a monthly cost per line of between $9000 and $15,000. Facsimile service is controlled by Embratel through Telebras, which has installed 5000 locally manufactured machines since 1985. Demand for fax machines is so high, however, that the U.S. Embassy in Brasilia estimates that 10,000 contraband fax machines have been brought in from abroad.

The market for data communications services has been growing by roughly 25% annually since the mid-1980s, helping to boost the percentage of revenues Embratel earns from these services from 10% in 1985 to 30% today. In 1991, Embratel invested $575 million to expand and digitize its Transdata, Transdata Plus, Renpac, Datasat and Digisat data and packet-switching networks. Despite these outlays, Embratel faces an estimated backlog of 11,000 customers for its data communications services that company officials estimate could generate an additional $15 million in monthly revenues.

At an international data communications conference held in Sao Paulo last April, Embratel President Carlos de Paiva Lopes called on the private sector to help his company meet pent-up demand for data services by constructing private data networks and access points to the public network. He also suggested that private firms bring in new services and technologies, and form joint ventures with public operators to explore those services.

As an example of this, Telesp, the local telco in Sao Paulo, is helping IBM's Brazilian subsidiary sell additional capacity on its new $1.2-million private data network to other firms. A Brazilian company, CMA, uses Embratel's long-distance network to operate the largest private data bank in Latin America, linking more than 4000 terminals.

Private companies like CMA can lease lines for data transmission through Embratel and local telcos, and firms that are 51% Brazilian-owned can build and operate their own private communications satellites. Smaller firms will be able to tap into private data lines available on Brasilsat BI and BII, the next generation of Brazilian communication satellites. The $400-million satellites are being built by Hughes, and will be used primarily for data transmission and to relieve high-traffic voice circuits when launched in 1994.

Other U.S. corporations vying for Brazil's private data and satellite markets include GTE Spacenet and AT&T, which provide Embratel with key technologies for its Datasat Bi network, which serves 70 small and medium-sized companies. The government is also tendering bids for a privately owned, low-orbiting satellite that will transmit voice and data nationally via narrow-band radio.

Telebras—Another Telmex?

AT&T, Hughes and IBM are not the only companies looking at Brazil's newly deregulated telecom industry for investment opportunities. The sector has caught the eye of powerful institutional investment firms like Goldman Sachs and Salomon Brothers, so much so that Salomon advised its clients in November 1991 that Telebras' stock represents the best telecom investment worldwide. Speculation about the possible privatization of Telebras fueled a 6000% jump in its stock price over 1991, well above Brazil's 432% inflation rate last year. Despite these gains, Telebras' stock currently sells for only 10% above its per-share asset value, while Mexico's Telmex stock sells for four times its per-share asset value.

Private investors are banking on the congressional approval of an amendment to the Brazilian constitution that would permit private companies to explore public utilities services. Although the amendment was scheduled for passage in 1993 as part of a larger revision of Brazil's 1988 constitution, the head of Brazil's National Bank for Economic and Social Development recently declared that the government would introduce a separate amendment this year to speed up the privatization process. That amendment is now being studied by the National Secretariat for Economic Policy and Brazil's Commission on Privatization. Telebras President Jose Ignacio Ferreira is confident that the amendment will be passed by the Brazilian Congress, in light of a poll showing that 55% of senators and congressmen already support the end of Telebras' telecom monopoly.

Telebras executives are busy smoothing the way for privatization. More than $300 million in Eurobonds were offered over the past 12 months to test investor receptivity to the eventual sale of $1.1 billion in American Depositary Receipts to international investors. With the proceeds, the government hopes to meet annual investment targets of $3 billion until the end of the decade.

At the corporate level, officials are restructuring Telebras to return it to its traditional role as a holding company rather than policy arbiter. Ferreira and his staff believe that Telebras' new role as a privatized holding company, together with private investment and deregulation, will be the answer to the problems that face Brazil's telecom system and will prepare the country for sustained growth in the 21st century. **T**

Anne C. Dibble is President of Mehta Trading, Santa Maria, Calif.

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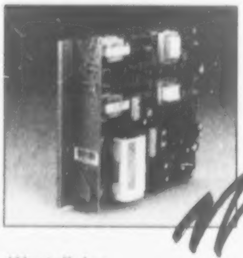

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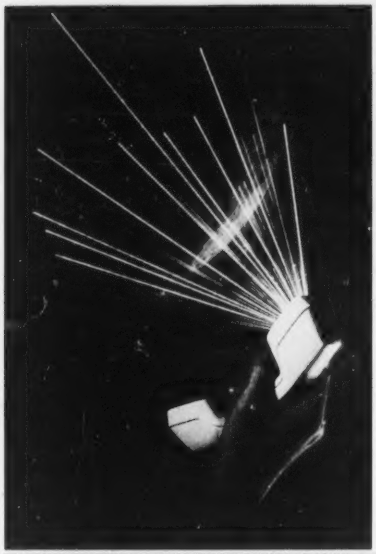
AN INTERTEC PUBLICATION MAY 4, 1992 FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET $3

THE WIREL[illegible]E IN THE U.S[illegible]PA

In the news...

ISDN CONNECTS IN NEW YORK STATE

AT&T OFFERS NUMBER PORTABILITY



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Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

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A WIN-WIN SITUATION: THE WIRELESS OFFICE IN THE U.S. AND EUROPE
By Jonathan Tarlin. How quickly will businesses move to wireless communications? The opportunity is there for manufacturers and service providers on both sides of the Atlantic as traditional wireline and wireless telecom products and services converge
Cover art by Michel Tcherevkoff, The Image Bank

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By Michael Galbraith. NTT's decision to take its basic rate interface service nationwide caused a dramatic jump in customer interest. Now NTT and Japan are well on the way to completing a nationwide public ISDN

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By Carol Wilson. NFOEC attendees got an earful on video to the home—from the chief technologist of CableLabs. And his message may not have been a welcome one for local exchange carriers

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The company has begun spreading the engineering, construction and operations experience gained in Cerritos throughout its organization.

"We're starting now to take Cerritos and go from the 'planning' stages to the 'doing' stages," said Mike Hamilton, manager of advanced operations testing. "It's particularly important for our fiber-in-the-loop deployment plans to get these results and analysis and begin applying them to our day-to-day operations."

"Our charter here is to gather knowledge, then funnel it back throughout the company," echoed Don Bache, general manager of advanced operations testing and day-to-day head of the Cerritos project. "We use Cerritos as a testing ground not only for technology, but also for service and operations experience."

For example, Cerritos has helped GTE acquire standard engineering and operations procedures, including fiber-splicing techniques. Those skills are now being passed on to workers throughout the company, Hamilton said.

GTE also has been able to evaluate and standardize on fiber products such as optical loop fault finders and splice closures.

To further ramp up the company's fiber operations expertise, the company placed into service last year an Operations Management Center, which will monitor the Cerritos fiber network and help GTE develop cost-effective support systems for fiber, said Bache.

Cerritos also is helping GTE get a handle on the customer demand for video and on other broadband services. Although surveys and polls provide proof that consumers want broadband to the home in concept (see story at right), the real-life experiences of Cerritos residents give GTE a much clearer view of what customers really want.

One such customer is Betty Hyatt, a Cerritos "super-user" seemingly involved in almost every aspect of the project. At home, Hyatt and her family are CenterScreen and MainStreet subscribers, in addition to being one of only two families receiving video-on-demand and video telephone service.

Hyatt also uses video-on-demand as a second-grade teacher at Benito Juarez Elementary School, one of the two grade schools involved in the project. She uses the system to pull up programs from a video library to augment her lessons and uses the videoconferencing capability to allow her students to hold meetings with video pen pals at its partner school across town.

Hyatt gives all the services high marks. At home, her family enjoys the convenience of having a variety of services at their fingertips, while at school, she almost immediately felt comfortable with video in the classroom. "The technology is at my service; its serving me," she told *Telephony.*

"We have been able do some very

continued on page 20

Clarification

Last week's cover story, "Nynex embarks on a new road" (page 33), was written by Charles F. Mason, *Telephony's* East Cost Bureau Chief. The byline was inadvertently dropped during production.

Doctors, teachers want broadband net

A poll released late last month shows strong support among education and health professionals for the development of an advanced telecommunications network.

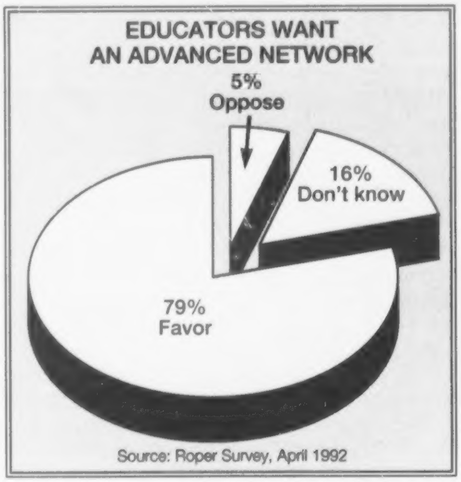
Respondents in the poll, conducted by the Roper Organization on behalf of GTE, indicated telephone companies need to play a key role in developing a national broadband network. And the 400 education and health care administrators polled supported public policy changes to make that possible, including telco entry into the cable TV and information services business.

According to the survey, of those familiar with the cable/telco cross-ownership ban, 77% favored legislation that would lift the ban. Meanwhile, 76% said telcos should be allowed to transmit services they have created, while only 4% think they should be limited to providing transmission services alone.

In order to broaden options available to consumers, seven of 10 respondents said they would like to see marketing partnerships between telcos and cable companies to provide information services in tandem.

The respondents showed a strong appreciation of the role that advanced telecom services could play in both the education and health care fields: 79% of educators and 75% of health care executives said they were in favor of the creation of an advanced, public communications network.

Educators said a broadband public network would lead to applications such as on-line access to video databases and research libraries, networking with other schools and distance learning. Health care providers cited applications including instant access to medical data and research and long-distance visual consultations among doctors. ◼



Source: Roper Survey, April 1992

A majority of education leaders familiar with proposed legislation favor creation of an advanced fiber optic communications system.

A WIN-WIN SITUATION: THE WIRELESS OFFICE IN THE U.S. AND EUROPE

JONATHAN TARLIN

The development of wireless PBXs, key systems and Centrex systems is creating opportunities for manufacturers and service providers on both sides of the Atlantic.

As traditional wired and wireless telecommunications products and services converge, both incumbent and new players could benefit from the resulting technologies. There are several forces that are driving the development of wireless office products in the U.S. and Europe: the search for new growth areas in relatively mature customer premises equipment markets; the development of new personal communication services (PCS), particularly personal communication networks (PCNs) and CT2 (cordless telephone, second generation); and the market demand for mobility and portability as witnessed by growth in other mobile communications markets such as cellular and paging.

But the real potential for wireless office telephony, of course, depends on the level of market demand.

Businesses are interested in wireless office products because of the potential for enhanced productivity and the cost savings. Productivity is enhanced because the business can be reached at all times. Some studies have estimated that two-thirds of calls to businesses do not reach their intended party. Businesses that experience a large number of moves, adds and changes may experience cost savings because wireless systems often are less expensive to reconfigure than wireline systems.

EMCI Inc. surveyed 100 telecommunications managers in the U.S. and 100 in France, Germany, Italy and the U.K. to estimate demand for wireless office telephone products. In the U.S., approximately 19% of those

continued on page 32

Getting a wireless head start

Companies that are already involved in wireless office telephone manufacturing for either the U.S. or Europe include:

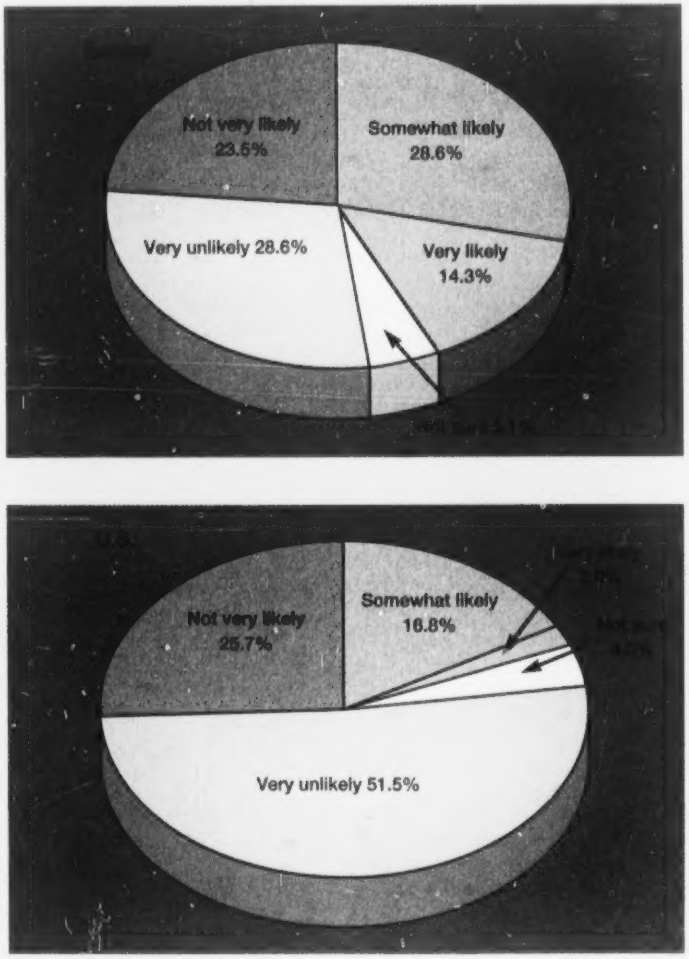
Alcatel (France)
Ascom (Switzerland)
AT&T (U.S.)
Bosch (Germany)
Ericsson (Sweden)
Ferranti (U.K.)
GPT (U.K.)
Hagenuk (Germany)
Matra (France)
Motorola (U.S.)
Nokia (Finland)
Northern Telecom (Canada)
Philips (Netherlands)
Siemens (Germany)
Various Japanese companies

surveyed said they were interested in upgrading at least part of their current office systems to wireless. The comparable number for Europe was 43%, considerably higher than the U.S. (Figure 1). In both cases, the question was based on a 30% to 50% price premium for wireless compared to wired systems.

Differences between Europe and the U.S. here may be attributed in part to Europe's generally higher awareness of wireless office telephony. According to the survey, 61% of telecommunications managers in Europe were aware of at least one wireless office product; in the U.S. only 36% were aware. Although there are differences in awareness levels, telecommunications managers in Europe and the U.S. mainly agree on what the most important factors are in purchasing any office telephone system (Table 1). Both consider quality the No. 1 consideration, followed by maintenance and service support. For purchasing wireless systems specifically, both groups ranked advanced handset features and the ability to roam throughout the office (across multiple base stations) as important considerations.

Based on this survey information, EMCI estimated the short-term (to 1995-1996) market potential for number of wireless office lines (Figure 2). It segmented this demand by large firms (those with more than 400 installed lines) and small firms (those with less than 400 lines). For France, Germany, Italy and the U.K., the market potential is estimated at 6.4 million lines. In the U.S., this estimate is 2.3 million. It should be noted, however, that the U.S. estimate is conservative given the relative lack of awareness of wireless office telephone products.

FIGURE 1
LIKELY INTENTION TO PURCHASE
WIRELESS OFFICE SYSTEMS



Source: EMCI Inc.

Standards and Products

Wireless office telephone systems encompass various products and technical standards. In the U.S., there are no clear standards for wireless products. Some U.S. products may operate under unlicensed Federal Communications Commission Part 15 frequencies such as spread spectrum systems like the one proposed by a joint venture between Cylink and Alcatel. Currently, there are several ongoing PCS experiments involving wireless PBXs, most notably McCaw/Ericsson and Southwestern Bell/Panasonic, which are working on cellular/wireless PBX hybrid products.

In Europe, there are several standards and proposed standards for wireless office phone products, including CT2 common air interface (CAI), digital European cordless telecommunications (DECT), CT3, and DCS 1800. CT2 CAI has been accepted as a Pan-European standard for telepoint (public), residential and business applications.

France and Germany currently have experimental CT2 telepoint systems that may be used in conjunction with office applications. The U.K., after several false starts, will probably implement a CT2 system by the end of the year. DECT has not yet been accepted

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as a Pan-European standard, but is expected to be approved in the future. According to Ericsson, DECT's major proponent, the technology is more functional and provides more capacity than CT2, particularly through base station handoff capabilities. CT3 is the precursor to DECT and follows many of the same protocols, while DCS 1800 is the Pan-European standard for PCNs.

Business Opportunities

The equipment manufacturers best positioned for this market are those currently involved in traditional PBX manufacturing, mobile radio manufacturing, or both (see sidebar on page 31). Additionally, companies that are international in scope may gain benefits through economies of scale of research and development, and production for an international market. The synergies of companies that manufacture and distribute both wired and wireless equipment will be an important factor for success in this market.

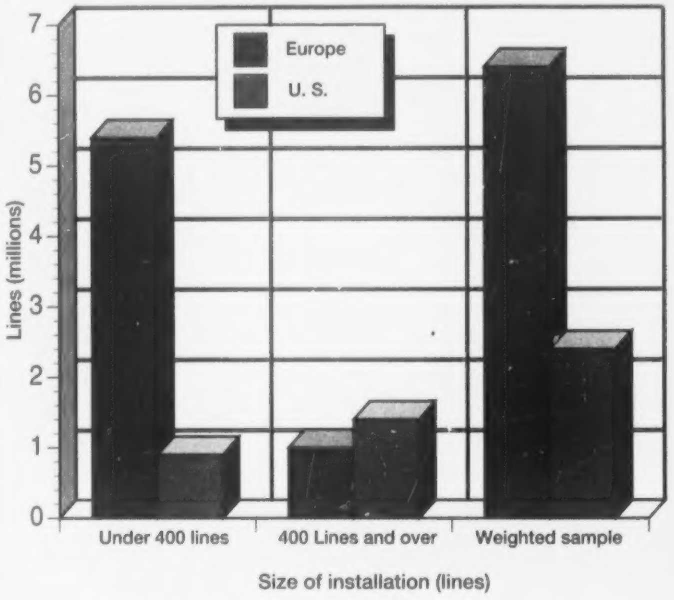

FIGURE 2 SHORT-TERM DEMAND POTENTIAL FOR WIRELESS OFFICE LINES: EUROPE AND U. S.

Source: EMCI Inc.

For distributing and marketing wireless office products, there are several possible strategies. One possibility is that traditional PBX manufacturers continue using their existing distribution channels such as direct sales, interconnect companies and local exchange carriers. It needs to be emphasized, however, that the very nature of a wireless product will require considerably more support and maintenance than traditional PBX systems. For this reason, wireless service providers, such as cellular or future PCS providers that are accustomed to dealing with the complexity of mobile communications, may also be points of distribution and marketing. This will be particularly true if wireless office handsets are compatible with an operator's public network such as a CT2 or PCN system. The operator then has a vested interest in distributing handsets to potential customers.

The development of wireless office telephony is another step that is blurring the distinctions between the wired and wireless worlds.

For traditional CPE manufacturers, wireless systems offer a significant expansion opportunity in a maturing market. For mobile radio manufacturers, there is the potential to expand the portfolio of product offerings.

For LECs, wireless PBX equipment sales and wireless Centrex service can increase revenues. For wireless carriers, there is the opportunity for providing new services in conjunction with business applications. Clearly, wireless office telephony has something to offer everyone. ■

TABLE 1 COMPARISON OF IMPORTANCE OF FACTORS IN TELEPHONE SYSTEM PURCHASE: EUROPE AND U. S.

Factor	Rating	Rank	Rating	Rank
Quality	8.9	1	9.5	1
Maintenance/ service support	7.5	2	9.1	2
Price	6.7	3	8.1	4
Ease of systems upgrades/changes	6.7	4	8.3	3
Networking capabilities	6.6	5	7.5	6
ISDN compatibility	6.4	6	5.8	8
Cost of moves, adds, changes	5.7	7	8.0	5
Processing capabilities	5.6	8	6.8	7

Jonathan Tarlin is a Senior Consultant at EMCI Inc., Washington, D.C. EMCI specializes in multiclient and proprietary market research studies in the wireless communications industry. The information in this article was taken in part from EMCI's study, European Wireless Office Telephony and U.S. Wireless.

Telephony

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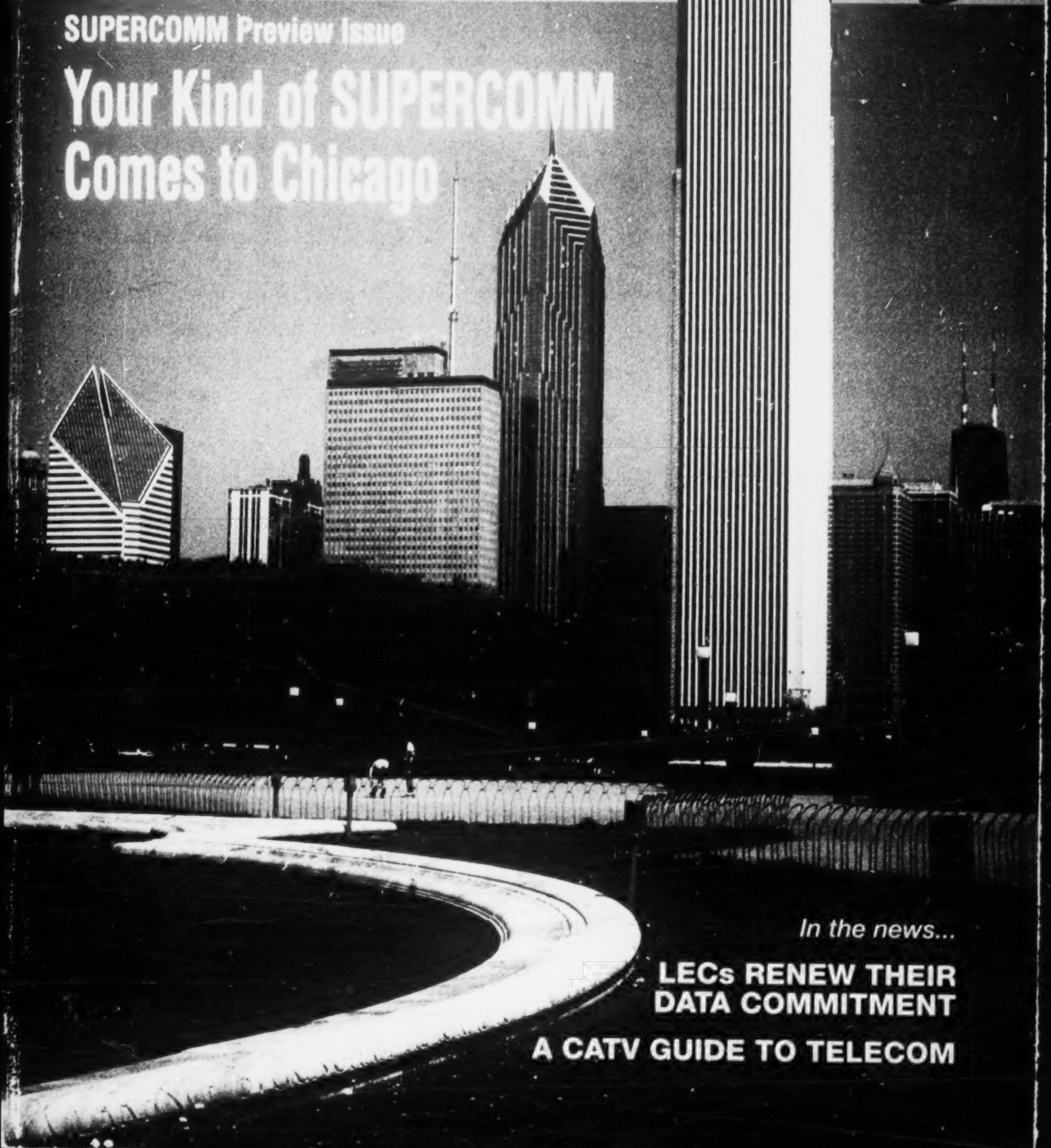
SUPERCOMM Preview Issue

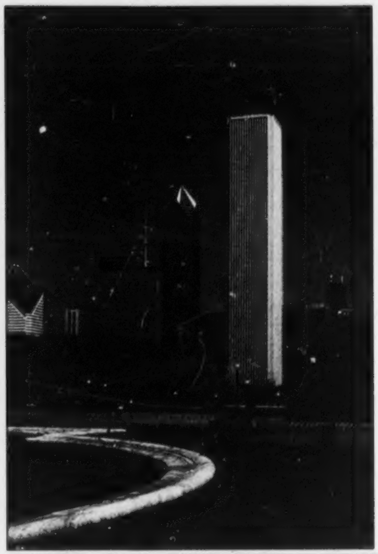
Your Kind of SUPERCOMM Comes to Chicago



In the news...

LECs RENEW THEIR DATA COMMITMENT

A CATV GUIDE TO TELECOM



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Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

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SUPERCOMM Preview
YOUR KIND OF SUPERCOMM COMES TO CHICAGO
A *Telephony* Staff Report. Head for Chicago in early June to see hot technology and observe technology trends. As a major public network show in the U.S., SUPERCOMM has become the place where manufacturers show off their newest wares and their most popular applications. To peruse specific products that will appear on the show floor, turn to page 49
Cover photograph by Laura M. Doyle

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Its digital aircraft telephone will compete with GTE Airfone

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SURVIVING CHICAGO—AND LOVING IT 33
By Steven Titch and Ann H. Lindstrom. Forget the tourist bureau brochures and views of the skyline from the Sears Tower. Here's what you really need to know about Chicago, from its transportation systems to its nightlife to its streetlife

TRIOS HELPS TDS SATISFY CUSTOMERS 88
By Terry Prahl. To meet customers' needs in the competitive market of the 1990s, service providers must exceed customer expectations. TDS found a way to do so by creating a system that integrates billing and much more

FITL AWARD HONORS FIBER 'PIONEERS' 94
By Deborah Pfeiffer. As fiber-in-the-loop deployment begins to heat up, *Telephony,* ADC and Corning strike out to recognize the individuals who've pushed the FITL boundaries onward

PERSPECTIVES 112
Editor Carol Wilson reports on telecom leaders' speculations at the SS7 Summit on building the network of networks

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FITL award to honor fiber 'pioneers'

DEBORAH PFEIFFER, Associate Editor

There's no denying that fiber will be heading for the curb in the not-so-distant future. In fact, 1992 and 1993 are shaping up to be cornerstone years for fiber design and deployment. There's also no denying the important role fiber in the loop (FITL) will play in the network's future.

In honor of the efforts involved in getting fiber into the local loop, *Telephony*, ADC Telecommunications Inc. and Corning Incorporated will recognize individuals who have helped push FITL deployment. They will present the first annual *Telephony's* Fiber in the Loop Award at the U.S. Telephone Association's annual meeting in New Orleans in October. The award will go to individuals who have played significant roles in developing and deploying FITL technology.

Award winners will be chosen from three categories: vision, network design and implementation, and service development.

The vision award will go to an individual who has consistently and publicly forwarded the cause of FITL development.

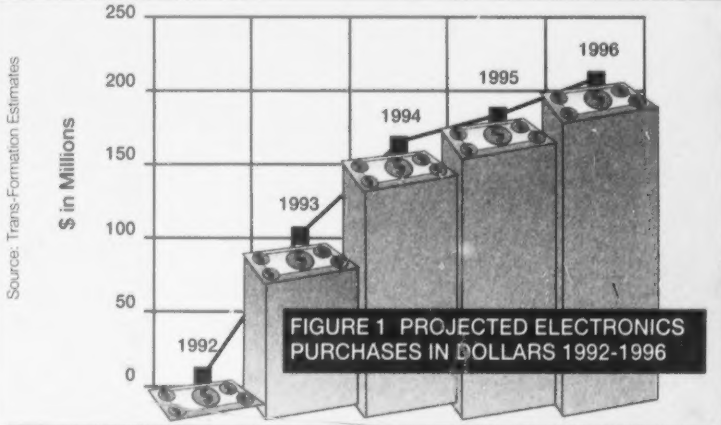
"Certain individuals have played a central role as technology pioneers in pulling the industry into its future and promoting the best interests of consumers and the industry itself," said Larry Lannon, *Telephony* publisher. "*Telephony* is extremely happy to participate in honoring these pioneers—and all of their many colleagues throughout the industry whose energies and abilities have also contributed.

"FITL technology is at the center of the future of the telecom industry. It opens up vast vistas of potential services and new revenue streams that go well beyond what was possible in the voice-only past."

The network design and implementation award will honor innovative, yet real-world, approaches to FITL deployment, such as unique system designs, deployment strategies and cost-saving measures or involvement in creative corporate partnerships.

Such innovations are critical to the market, noted Bill Hamer, vice president of advanced development for ADC.

"One critical thing as the market moves along is realizing that there is more to fiber in the loop than entertainment video and basic telephone services," Hamer said. Fiber optics in the local loop, he said, will significantly change how the telecommunications network is used, permitting telephone companies to provide advanced services.



Source: Trans-Formation Estimates

FIGURE 1 PROJECTED ELECTRONICS PURCHASES IN DOLLARS 1992-1996

1992	1993	1994	1995	1996
$8,050,000	$103,950,000	$165,240,000	$184,116,000	$209,124,000

Telephone companies need leadership to extend their capabilities to a more dynamic position, especially relative to alternative service providers, Hamer said. Telcos need not just technological innovation, but also marketing innovation, he said.

In light of that imperative, the service development award will recognize an individual's involvement in actual, market-focused deployment efforts with customers in a trial or early deployment of FITL.

Going the Extra Mile

With the efforts of individuals such as these, fiber deployment is starting to take off.

Several factors are pushing fiber closer to the loop. First and foremost, it seems that fiber may be finally reaching cost parity with copper for at least some FITL applications. Local exchange carriers have gained experience in product trials, while vendors have field-tested and refined their products. By evolving its technical advisory for narrowband FITL systems into a technical reference, TR-909, Bellcore has provided the industry with some guidelines. Several carriers have committed to first-office applications this year. And two or three carriers should award the first volume contracts for FITL systems this summer.

The first-office applications and volume contracts are key because they allow FITL vendors to ramp up at least limited production, which should help drive down system prices.

"In 1988, fiber to the curb

continued on page 96

Award *continued*

seemed imminent. Fiber deployment has occurred a lot more slowly than initially predicted," said Mark Lutkowitz, president of research firm Trans-Formation Inc. "But this year will be the first year of first-office applications and small-volume shipments. Next year, we'll see the real startup."

Trans-Formation forecasts that fiber-to-the-curb electronics purchases will hit 209 million in 1996, with installations reaching 942,000 lines (Figures 1 and 2).

One area that Scott Robbins, manager of fiber marketing for telephony applications at Corning, sees as very promising to the FITL market is that Bell operating companies are beginning to use fiber for rehabilitation. "They actually are putting in fiber in distribution areas, at houses. Their first-office applications are aimed directly at that," Robbins said.

Great progress also has been made bringing operations support systems into line, Robbins noted, an area where good work has been done and needs to continue.

"There's great movement in the FITL area. Critical processes are getting ironed out," said Robbins. "[The FITL] award is geared toward the people who are helping iron out these processes.

"We consider a wideband-capable network to be fundamentally important to this country's infrastructure. Corning will be a part of any award that takes that position."

William J. Cadogan, ADC president and CEO, echoes Robbins' view on the importance of fiber.

What have you done for FITL lately?

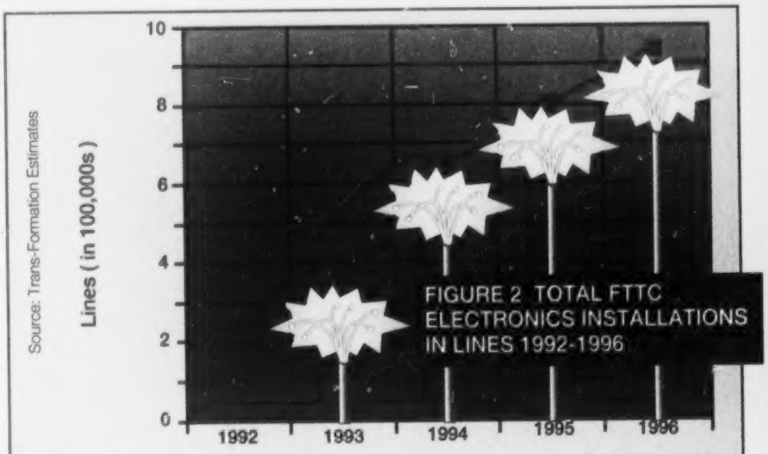
It's easy to nominate someone that you think deserves *Telephony's* Fiber In The Loop Award.

There are just three simple steps:

1. Make sure the nominee is a current or retired employee of a local exchange carrier or Bellcore,
2. Include the nominee's name, company affiliation and accomplishments, and
3. Mail or fax the nomination before July 15 to:

Telephony
55 E. Jackson Blvd.
Suite 1100W
Chicago, Ill. 60604
Fax (312) 922-1408

"As the public network evolves to meet commercial needs, the push to bring fiber in the loop to reality will continue," Cadogan said. "New network architectures are being developed with this vision in mind. A phased, incremental approach is required to bring the necessary electronics into position. Fiber in the loop brings fiber-based services closer to the end user at an economical cost to service providers."



Source: Trans-Formation Estimates

FIGURE 2 TOTAL FTTC ELECTRONICS INSTALLATIONS IN LINES 1992-1996

1992	1993	1994	1995	1996
23,000	350,000	648,000	804,000	942,000

FITL deployment is strategically important as the network migrates to broadband services, and multirate, multimedia applications, Cadogan added. With FITL deployment comes the availability of video and complex data services to businesses and residences at feasible rates, along with the opportunity to transport new services such as on-line banking, home shopping and more sophisticated telecommuting to users, he noted.

"Just as FITL deployment is not static, its implementation is not an isolated activity. It will take many years to convert all loop plant to fiber, and FITL will need to function effectively along with other transport options that will become available as technology continues to advance," Cadogan maintained.

It is the award's purpose to honor those people who contribute greatly to and promote this conversion process.

To be eligible for the award, nominees must be current or retired employees of local exchange carriers or Bellcore. Employees in the vendor community are ineligible, along with retired carrier or Bellcore employees who have taken positions within the vendor community.

Nominations for the awards should include the nominee's name, company affiliation and accomplishments. They will be accepted between May 16 and July 15. Nominations should be sent directly to *Telephony*, 55 E. Jackson Blvd., Suite 1100W, Chicago, Ill. 60604; fax (312) 922-1408.

After the July 15 deadline, a four-member committee will evaluate the nominees. The evaluation committee will consist of Carol Wilson, *Telephony* Editor; ADC's Cadogan; Jan Suwinski, executive vice president of Corning's Opto-Electronics Group; and a Bellcore representative as yet unnamed.

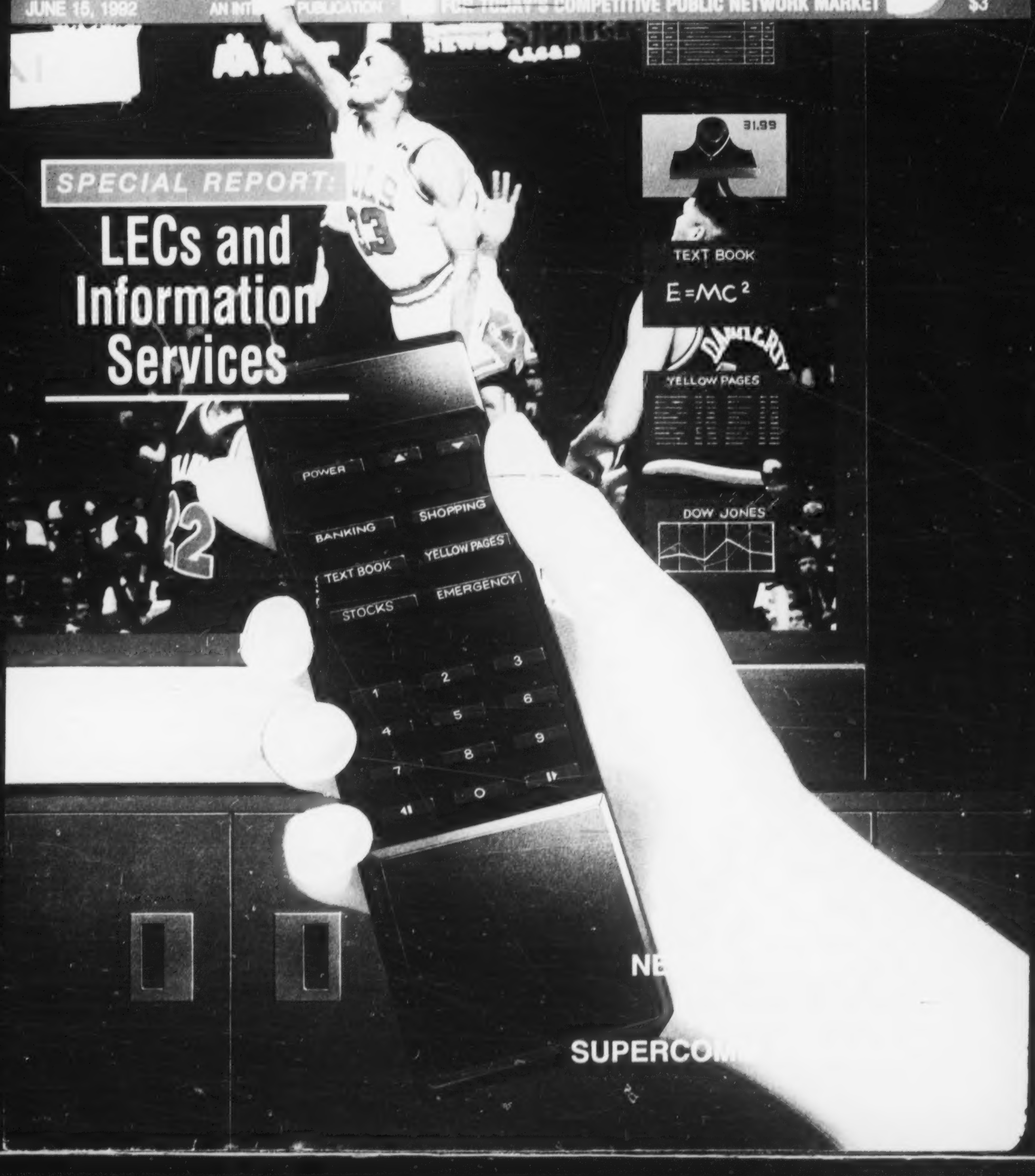
The award winners chosen by the committee will be honored at a reception open to the entire industry and hosted by *Telephony*, ADC and Corning. The winners and guests will also be treated to a dinner sponsored by the three partners.

"Fiber in the loop is the next critical step in the continued evolution and enhancement of America's telecommunications infrastructure. Corning is proud to participate in this annual recognition of individuals who are leading the way," said Suwinski. T

Data Communications Bonus Inside

Telephony

JUNE 15, 1992 AN INT PUBLICATION FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET $3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SPECIAL REPORT:

LECs and Information Services

NE

SUPERCOM

MONDAY, JUNE 15, 1992 Volume 222, No. 24

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

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SPECIAL REPORT: TELCOS IN INFORMATION SERVICES
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Cover illustration by Michael Jones, photograph by Freddie Bautista

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TELEPHONY (ISSN 0040-2656) is published weekly (except for a combined issue the last week of December) for $45.00 one year, $70.00 two years. Outside U.S. $80.00 one year. Air mail for $185.00 for U.S., $225.00 for Canada. Air Express one year outside U.S. and Canada for $150.00. Single copies $3.00 each (payable in advance); outside U.S. add $1.00. Subscription rates apply to employees of operating telephone companies, telephone consultants, contractors, interconnect companies, specialized common carriers, military, government, associations, private communications users, schools, libraries. Published by Intertec Publishing Corp., 9221 Quivira Rd., Overland Park, KS 66215. Second-class postage paid at Chicago, IL, and additional mailing offices. POSTMASTER: Send address changes to TELEPHONY, P.O. Box 12960, Overland Park, KS 66282-2960. Copyright 1992 by *Telephony* Division, Intertec Publishing Corp. All rights reserved. Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by *Telephony* for libraries and other users registered with the Copyright Clearance Center provided that the fee of $1.50 per page is paid directly to CCC, 21 Congress St., Salem, MA 01970. Special requests should be addressed to the publisher.

SPECIAL REPORT:
THE TELCOS IN INFORMATION SERVICES

Telemarketing service agencies:
Can they lead LECs into information services?

POWER
BANKING
SHOPPING
TEXT BOOK
YELLOW PAGES
STOCKS
EMERGENCY

DANIEL N. MILLER

Aside from telephone answering service (TAS) providers, telemarketing service agencies (TSAs) are probably the longest standing group of enhanced service providers (ESPs) on the public switched telephone network.

If this cluster of acronyms doesn't send you to Vanna for another vowel, consider the conclusions shown on page 110 from the *Service Bureau and Telemarketing Service Agency Database and Strategic Report* just released by New York-based Strategic Telemedia. In mid-1991 Strategic Telemedia mailed questionnaires to more than 750 TSAs asking them to identify key executives, 1990 call traffic and reverue, growth expectations, leading applications, campaigns and customers, ancillary services offered, technology in use and pricing policy. The research showed that today's sophisticated TSAs offer a glimpse of the future of

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TABLE 1 TOP 25 AGENCIES

	Companies	Installed ines or positions	Type
1	Lo-Ad Communications	27,000	Hybrid
2	HSN 800/900 Corp.	20,000	Hybrid
3	American Communications & Engineering'	14,000	Hybrid
4	Call Interactive	10,000	Hybrid
5	Audio Communicationd Inc. (ACI)	5400	Hybrid
6	JC Penney Telemarketing Inc.	5000*	Live
7	Pioneer TeleTechnologies Inc.	4890	Live
8	Network Telephone Services Inc. (NTS)	4578	Auto
9	National Data Corp. (NDC)	4100	Hybrid
10	AT&T American TransTech	4000	Hybrid
11	Sprint TeleMedia	3700+	Hybrid
12	The Gateway Group	3500	Auto
13	Ameritech Audiotex Services Inc.	3500+	Auto
14	MCI/Telecom USA Direct	3425	Live
15	Phoneworks	3000	Auto
16	Source Communications	3000	Auto
17	AT&T-InfoWorx	3000+	Auto
18	DialAmerica Marketing Inc.	2900	Live
19	West Telemarketing Corp.	2755	Hybrid
20	Interactive Telemedia Inc. (ITM)	2688	Hybrid
21	Scherers Communications	2400	Auto
22	Idelman Telemarketing	2214	Hybrid
23	Matrix Message Centers	2150	Live
24	Matrixx Marketing Inc.	2094	Live
25	Bellatrix Communications	2000	Auto

'Since acquired by NTS

*estimated

Source: Strategic Telemedia 1991, Volume II telephone-based information retrieval and transaction processing services. Strategic Telemedia expects the evolution of TSAs to present new business opportunities and competitive challenges for both local exchange carriers and interexchange carriers.

In the study, the TSAs are segmented into three overall groups: live, automated and hybrid. Live agencies employ live telemarketing service representatives (TSRs) to handle media-stimulated inbound calls and to originate outbound telemarketing activities. Automated agencies employ interactive voice information or voice response systems primarily to support inbound information and entertainment services. Hybrid agencies are the fastest-growing segment. These agencies evolved as existing live or automated service bureaus and added new technologies in response to demand for greater functionality or capacity.

Table 1, which depicts the top 25 agencies, indicates that seven of the 10 largest shops are hybrids, while agencies such as JC Penney Telemarketing and Pioneer TeleTechnologies have remained predominantly live agencies that also rely on automated call processing and database systems.

It's a gold mine

These are some of the conclusions of the *Service Bureau and Telemarketing Service Agency Database and Strategic Report* from Strategic Telemedia.

- TSAs will generate call-based revenues of more than $3 billion in 1996, after deducting long-distance charges. That's up from a little less than $1.9 billion in 1990.
- In 1991 TSAs generated an estimated 274 million calls, both inbound and outbound, accounting for approximately 779 million minutes of use on various public networks.
- Industry leaders are emerging as one-stop shops not only for direct marketing, but also for marketing database development and list processing, advertising program production and development, order capture, payment authorization and processing, warehousing and order fulfillment.
- Large TSAs routinely integrate call processing, voice processing and information processing technologies, which provide a showcase for advanced network capabilities. They also demonstrate new revenue-generating applications that use the integrated services digital network and the advanced intelligent network and incorporate such network features as automatic number identification.

Evolutionary Trends

The breakdown of lines employed by these segments is shown in Table 2. The longest-standing industry participants are the service bureaus built around live operators handling inbound calls to support media-stimulated order capture, as well as outbound lead generation and telemarketing. Strategic Telemedia's survey shows, however, that live operators are giving way to automated voice systems, especially in the area of inbound information retrieval.

Of the 371,828 lines employed by TSAs, only 53% are served by live operators, and that percentage is shrinking.

TABLE 2
TOTAL NUMBER OF LINES BY SEGMENT

Live inbound	**18,530**
Live inbound/outbound	**97,240**
Live outbound	**51,941**
Hybrid	**103,271**
Automated	**100,846**
Total lines	**371,828**

Source: Strategic Telemedia, 1991

The growth of automated agencies has been fueled to a large degree by the increasing popularity of 900 numbers for caller-paid access to information and entertainment services. Centralized service bureaus connected to interLATA networks have taken the place of banks of tape recorders for inbound, automated services on local networks—the proverbial "soaps, 'scopes and jokes" business.

The future of 900 services is cloudy in the wake of increased government scrutiny and moves by Sprint TeleMedia and others to limit their offerings. High levels of growth in purely automated facilities is not expected to persist. Instead, hybrid agencies that support both live operators and automated voice processing systems will proliferate, as existing facilities, which were either exclusively live or exclusively automated, append the other technology to their core business to satisfy customer demand for one-stop shopping.

Survey responses indicate that today there is little functional integration between the automated and live sides of hybrid bureaus. In many cases, they act as two separate business units within an agency. Based on conversations held in conjunction with the survey, however, Strategic Telemedia expects these agencies to integrate more automated voice processing technologies into the critical path of their business.

A case in point is HSN 800/900 Corp., which got its start by developing "Tootie," a highly automated, voice response-based order capture system used by the Home Shopping Network. HSN has closely integrated live and automated functions to the point where roughly 50% of the 200,000 calls it receives per day are handled by Tootie rather than by a live TSR.

Besides changes in technology, there is also significant industry consolidation. Even though there are more than 1200 firms in the industry, the top five firms already account for 20% of the lines in use. In fact, the top 3% of firms represent 34% of the industry's capacity while the lower 52% represent

continued on page 112

only 10% of capacity.

The numbers are expected to continue to skew toward larger operators that can enjoy economies of scale, benefit from installing a greater number of automated lines, and build more valuable databases of customers, prospects and products from which their clients can benefit.

> *LECs and intraLATA carriers alike should be showcasing how TSAs act as leading-edge users of new network features.*

Heads Up

With the ban against Bell operating companies entering the information services industry crumbling, TSAs should be of interest to BOC management either as potential alliance partners or acquisition candidates. Leading Independent telephone companies such as Cincinnati Bell and Lincoln Telephone and long-distance carriers such as AT&T, MCI, Sprint and Advanced Telecommunications Corp., all of which do not operate under antitrust restrictions, have already dabbled in operating hybrid bureaus with some success.

An industry whose 1990 revenues were approximately $1.9 billion, after deducting long-distance charges, may not make the mergers and acquisitions specialists at an RHC salivate. This family of call centers is at the vortex of the multibillion-dollar telemarketing industry, which includes the inbound and outbound operations of major financial services companies, catalogue retailers, credit card issuers and others. Table 3 shows that the three leading service bureau applications in terms of 1990 revenues were order capture, lead generation and fund raising. Also making a significant showing were information retrieval services and customer service applications.

TABLE 3 TOP REVENUE-GENERATING APPLICATIONS IN 1990

Application	Total revenue in U.S. dollars	Percentage of revenue
Order capture	$510,472,304	28%
Lead generation	438,491,562	24
Fund raising	299,562,335	16
Information	185,852,557	10
Customer service	118,495,866	7
Polling/surveying	98,732,226	5
Dealer locator	96,357,018	5
Other (<5%)	88,151,810	5
Total	1,836,115,678	100

Source: Strategic Telemedia, 1991

LECs and intraLATA carriers alike should be showcasing how TSAs act as leading-edge users of new network features. This family of service providers actually has use for automatic number identification (ANI), dialed-number information service and custom local area signaling services.

They have integrated these often arcane features into their work flow and have demonstrated reduced operating expenses and promoted operator productivity.

In the near term, firms across many industries are expected to turn to judicious use of TSA functions to support more cost-effective methods for telephone-based direct marketing. As LECs sink a significant percentage of overhead expenses into customer service activities—including business office functions like order negotiation, billing inquiries and service order entry—the name of the game for managers of these operations may be to emulate hybrid TSAs to reduce operating expenses. Services now offered by full-service TSA shops foreshadow those that could be offered using the public network's enhanced services platforms for operator services, customer service, transaction processing and database marketing.

Operator services groups at LECs use essentially the same technologies as TSAs to provide directory assistance services. In fact, a manager of operator services for a large LEC, when asked the major difference between his operation and a large telemarketing service bureau replied, "about $4 an hour," referring to the hourly wage rate differential between the union shops operated by large carriers and an average TSA.

To control costs and foster productivity, telco managers have been quick to install new technologies to accelerate call handling and operator efficiency. The question remains whether LECs are using their internal operator service platforms to their greatest revenue-generating potential. TSAs, with operators on duty 24 hours a day with real-time access to product information, payment authorization mechanisms and customer profiles based on ANI, may provide a look at the operator services operations after divestiture. ■

Daniel N. Miller is President of Opus Research, a San Francisco, Calif., affiliate of Strategic Telemedia

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NOTE

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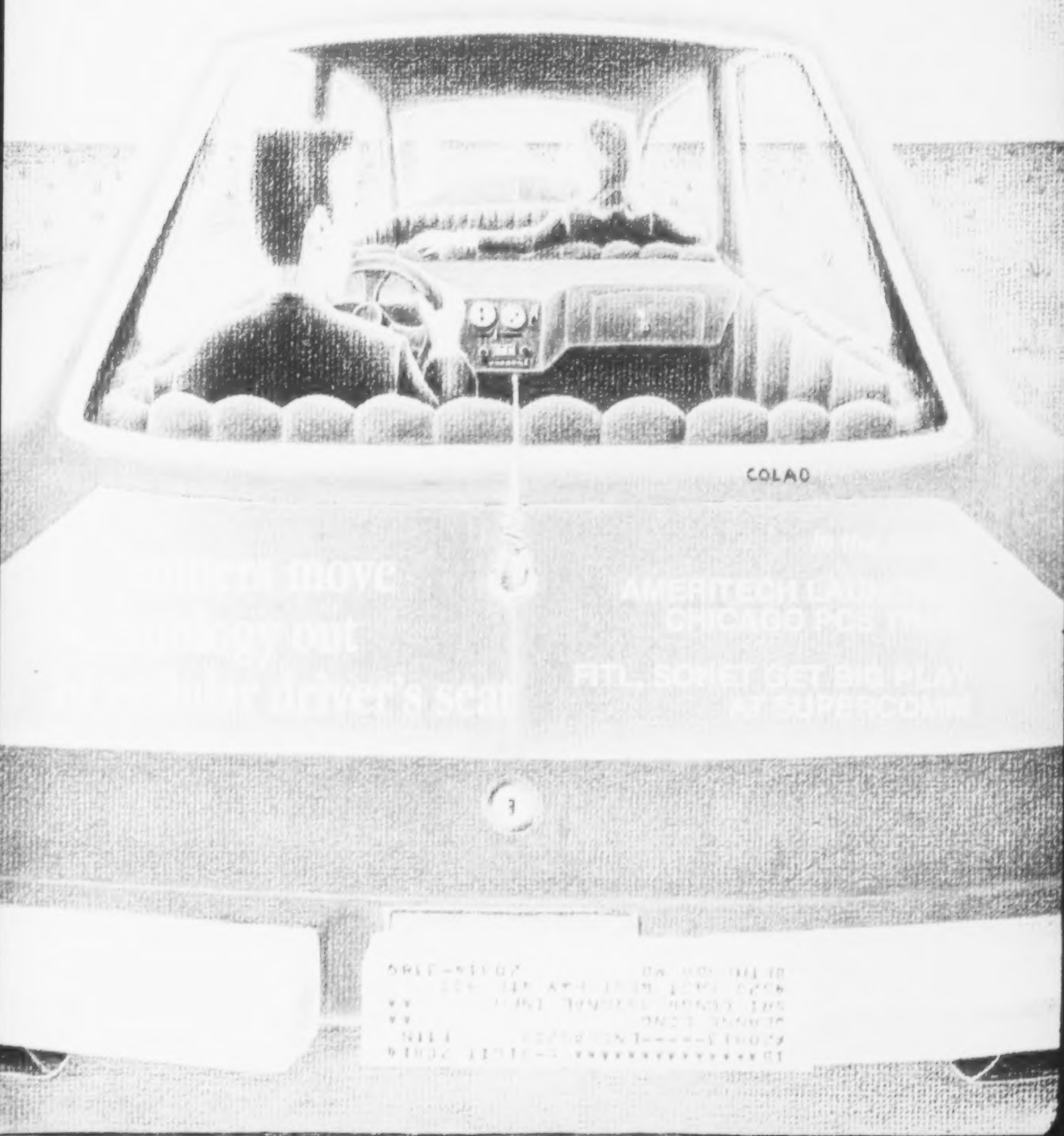
Telephony

AN INTERTEC PUBLICATION JUNE 22, 1992 FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET $3



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MONDAY, JUNE 22, 1992 Volume 222, No. 25

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

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TECHNOLOGY MOVES OUT OF CELLULAR DRIVER'S SEAT
By Michael W. Reene. To date, explosive growth has ruled the cellular communications industry. As the industry enters its second decade, it's time for cellular companies to position themselves in the market, looking at distribution strategies and commission structures. In short, they need to let customers decide what routes the cellular industry should take
Cover illustration by Jim Colao

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Actor George Wendt helps the RHC get its wireless Chicago market test going at SUPERCOMM '92

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When telco technicians find possible gasoline leaks, they need to call in professional know-how. A sample in a baby food jar sent off to a laboratory won't do the trick

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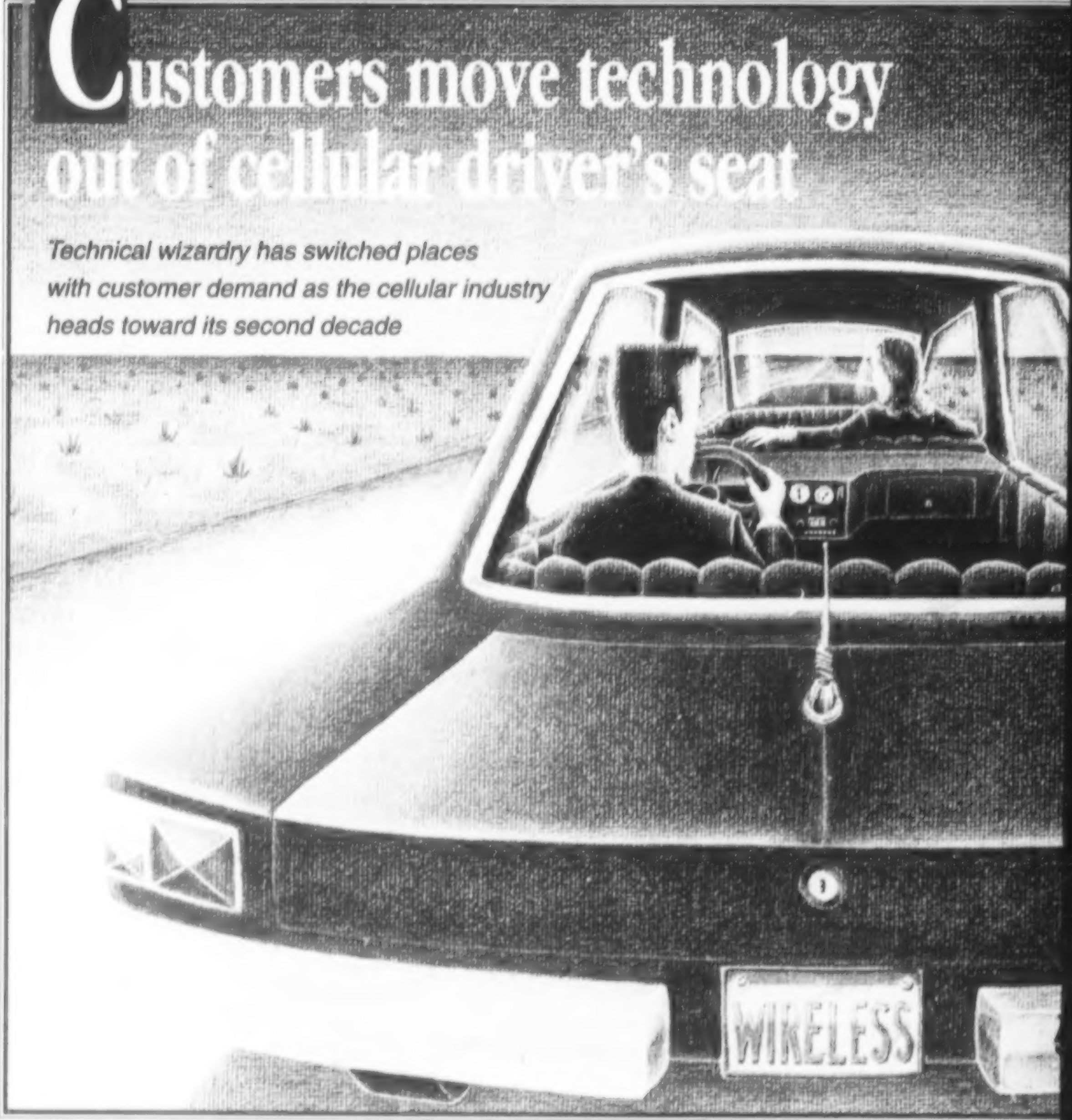
TELEPHONY (ISSN 0040-2656) is published weekly (except for a combined issue the last week of December) for $45.00 one year, $70.00 two years. Outside U.S. $60.00 one year. Air mail for $185.00 for U.S., $225.00 for Canada. Air Express one year outside U.S. and Canada for $150.00. Single copies $3.00 each (payable in advance); outside U.S. add $1.00. Subscription rates apply to employees of operating telephone companies, telephone consultants, contractors, interconnect companies, specialized common carriers, military, government, associations, private communications users, schools, libraries. Published by Intertec Publishing Corp., 9221 Quivira Rd., Overland Park, KS 66215. Second-class postage paid at Chicago, IL, and additional mailing offices. POSTMASTER: Send address changes to TELEPHONY, P.O. Box 12960, Overland Park, KS 66282-2960. Copyright 1992 by *Telephony* Division, Intertec Publishing Corp. All rights reserved. Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by *Telephony* for libraries and other users registered with the Copyright Clearance Center provided that the fee of $1.50 per page is paid directly to CCC, 21 Congress St., Salem, MA 01970. Special requests should be addressed to the publisher.

Customers move technology out of cellular driver's seat

Technical wizardry has switched places with customer demand as the cellular industry heads toward its second decade



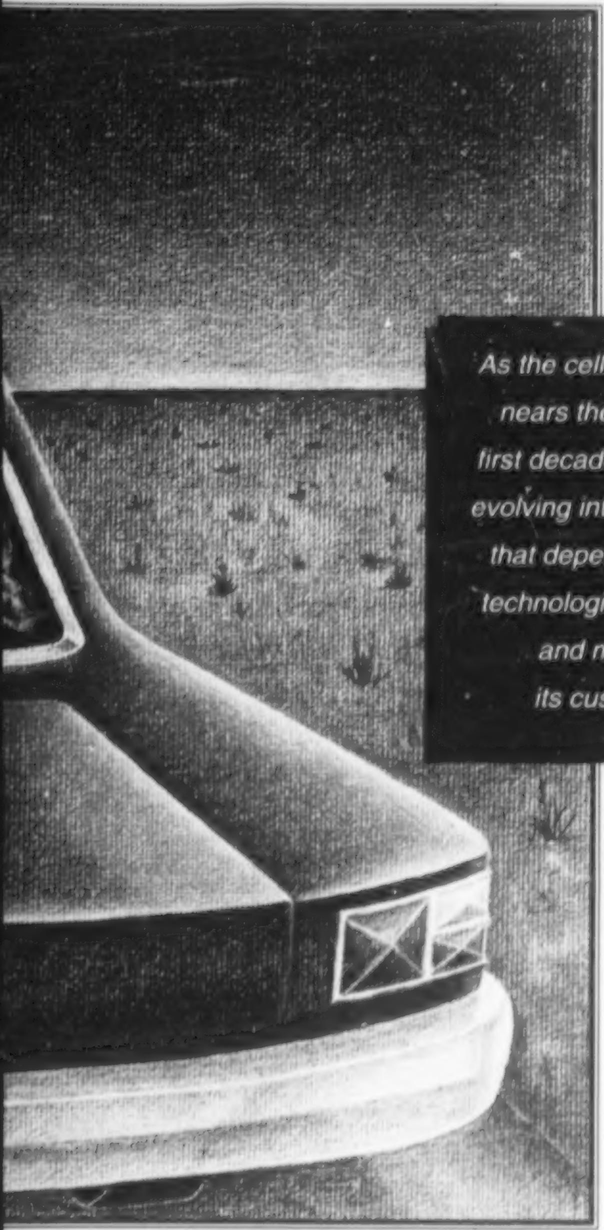
MICHAEL W. REENE

Explosive growth has been the rule for the cellular communications industry in its short nine-year existence. As the industry prepares to enter its second decade, its challenge is to continue that explosive growth rate. When the industry was born, multiple cellular carriers emerged very quickly, establishing comprehensive networks sooner than anyone thought possible. And those carriers handled the amazing growth rates with impressive dexterity.

To ensure continued growth and expansion, however, cellular companies must make some important strategic decisions. Each service provider must decide how to position itself in the market and what distribution strategies and commission structures most appropriately complement that choice.

In today's larger cellular markets, few companies, if any, can be all things to all customers. Companies must instead decide what products to offer, what related products to broker and how to assemble those elements into a package that will be most attractive to today's sophisticated cellular subscribers.

Cellular companies that decide to focus directly on



As the cellular industry nears the end of its first decade, it is rapidly evolving into a business that depends less on technological wizardry and more on its customers.

customers must organize themselves in ways that reflect the market position they stake out for the 1990s—providers of total communications solutions.

Each carrier also must decide the extent to which it wants to focus on the business arena and on the general consumer market, as well as how much it is willing to pay to attract each customer, and what kind of distribution channels are most appropriate and efficient.

These strategic challenges have arisen because today's cellular industry bears little resemblance to the business that began commercial operations only nine years ago. For one thing, the cellular arena already has proven itself to be one of the fastest-growing industries ever created.

The U.S. customer base grew from 5000 subscribers to nearly 6.5 million by mid-1991, and the number of U.S. cellular systems expanded from 32 to 592 by mid-1990. Nevertheless, those numbers translate into a market penetration of only between 1% and 2% of potential subscribers. Obviously, there are some tremendous opportunities to achieve even more growth.

Although more than 1000 companies now provide cellular service, 25 of those carriers cover more than 80% of the population, and the Bell regional holding companies account for seven of the top 10 cellular operators in the United States (Figure 1).

Capital investment in the cellular industry also has climbed to almost $8 billion. The overall market value of the industry currently is pegged at about $36 billion. Even though the industry spent a lot of money to put cellular networks in place, many companies poured even more capital into acquiring and consolidating their market positions.

The rapid growth in the number of cellular subscribers, along with carrier consolidation, has transformed the industry from a technology-driven business to one fueled by customer demands for enhanced communications capabilities.

Many of today's cellular customers are far more savvy and discriminating than the original subscribers of the 1980s. Today's customers want a single vendor to handle their communications needs. They are not interested in the details of transmission and switching technology.

They want the same services from cellular that they demand—and get—from their local exchange carriers: reliable, high-quality service; ease of use; ubiquitous coverage; detailed, accurate, on-time billing; and added-value services that range from facsimile and data transmission to portability of such enhanced features as voice mail, call waiting and call forwarding. In other words, they want transparent, on-demand access to information in multiple media.

Today's customer-driven industry puts cellular companies in a strong position to repackage and resell the communications products and services typically associated with the traditional public network. The companies that meet customers' total communications needs will be the ones to fuel—and profit from—the next round of explosive growth. Not only are today's customers indifferent to technology, they also are indifferent to who provides their service—as long as the vendor satisfies their communications requirements.

When LECs and equipment vendors would not or

continued on page 32

could not meet customer requirements in the 1970s and 1980s, value-added resellers (VARs) carved out a chunk of the market. Today's cellular carriers, faced with the same kind of market shift and attendant competition, are ideally situated to act as VARs themselves. Unlike LECs, though, cellular companies can determine for themselves how best to compete in this dynamic market.

Each cellular carrier operating today must decide to what extent it wants to focus on the network side of the business, whether it wants to shift its resources to the customer side or address both sides.

In other words, each company must decide whether to concentrate its resources on selling a commodity pipe—building more cell sites and marketing technology-based capacity to VARs—or going into the VAR business itself and focus on keeping existing customers and acquiring new ones by marketing the benefits of cellular communications. Few carriers will have the managerial and financial resources to do both.

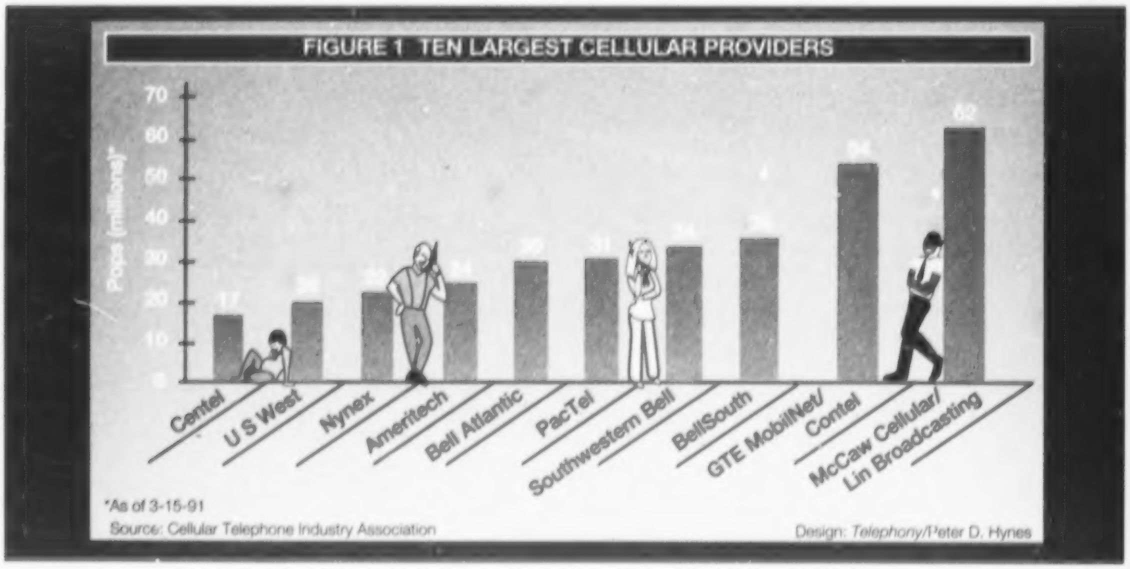


FIGURE 1 TEN LARGEST CELLULAR PROVIDERS

*As of 3-15-91

Source: Cellular Telephone Industry Association

Design: *Telephony*/Peter D. Hynes

A function of the pipe vs. VAR decision is how each cellular carrier defines customer value, or how much each subscriber is worth to that company in the long run. Although applicable to the large-volume business user, customer value also is relevant to the general consumer or incremental subscriber.

Some carriers hope to increase their business by attracting incremental customers. These carriers assume that a greater number of subscribers would offset the lower revenues generated by each consumer and are adopting marketing strategies that emphasize not only cellular's increasing affordability, but the security and convenience it offers.

New marketing strategies also are prompting these carriers to evaluate their distribution channels and commission structures to ensure the companies can attract customers at a reasonable cost.

Other carriers, however, continue to regard cellular communications primarily as a business productivity tool, at least for the foreseeable future. They argue that the occasional use of cellular service by incremental subscribers would not generate sufficient revenues to justify the marketing expense to attract that segment.

Each cellular company must look beyond the revenues it expects to garner from a potential subscriber's monthly bill. In addition to looking at the bottom line, cellular companies should ask: What will a particular incremental subscriber's long-term usage be? What is that customer's loyalty worth? What other opportunities might arise from a direct relationship with that subscriber?

If one carrier has decided to focus on the network or commodity pipe side of the market, then a direct relationship with a user may be of relatively low value—about $100 a subscriber. Another carrier that has decided to become a total service provider, however, would see a long-term relationship with that same customer obviously as more valuable—maybe as much as $600 a subscriber.

As the cellular industry nears the end of its first decade, it is rapidly evolving into a business that depends less on technological wizardry and more on its customers. Or, more accurately, the industry is becoming more dependent on the ability of service providers to satisfy customers' demands.

To meet those demands and boost industry growth beyond the current low market penetration, cellular carriers clearly must shift gears. To be a total communications provider, a cellular provider will need significantly different business processes than it uses to operate in today's cellular market. Customers already know what they want. To continue being successful in the next decade, cellular companies must position themselves to meet those needs. ■

Michael W. Reams is Southeast Regional Industry Director for the Telecom Industry Group at Andersen Consulting, Chicago. His responsibilities also include worldwide coordination of Andersen Consulting's wireless/cellular and enhanced services practices.

Telephony

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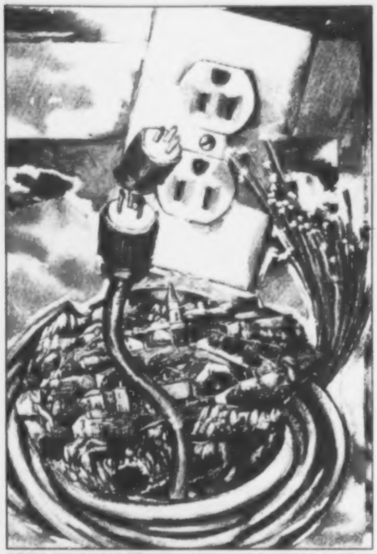
POWERING FIBER IN THE LOOP

In the news...

BELL ATLANTIC OPENS SONET SHOWCASE

CALGARY CUTS OVER FIRST TDMA SERVICE



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COVER STORY 22

TO BULK OR NOT TO BULK
By Jeff Davis. The fiber-in-the-loop revolution wages on with promises of broadband services for all. But ubiquitous FITL deployment is impeded most by a lack of a winning powering solution. Three basic solutions exist today, but none are clear-cut winners for all situations. Innovative power systems will make FITL a reality
Cover Illustration by Laura M. Doyle

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PERSPECTIVES 36
By Carol Wilson. Telcos: Your future depends on your vision. Your industry faces exciting, yet difficult, times. What can you do to compete?

TELEPHONY (ISSN 0040-2656) is published weekly (except for a combined issue the last week of December) for $45.00 one year, $70.00 two years. Outside U.S. $80.00 one year. Air mail for $185.00 for U.S.; $225.00 for Canada. Air Express one year outside U.S. and Canada for $150.00. Single copies $3.00 each (payable in advance); outside U.S. add $1.00. Subscription rates apply to employees of operating telephone companies, telephone consultants, contractors, interconnect companies, specialized common carriers, military, government, associations, private communications users, schools, libraries. Published by Intertec Publishing Corp., 9221 Quivira Rd., Overland Park, KS 66215. Second-class postage paid at Chicago, IL, and additional mailing offices. POSTMASTER: Send address changes to TELEPHONY, P.O. Box 12960, Overland Park, KS 66282-2960.
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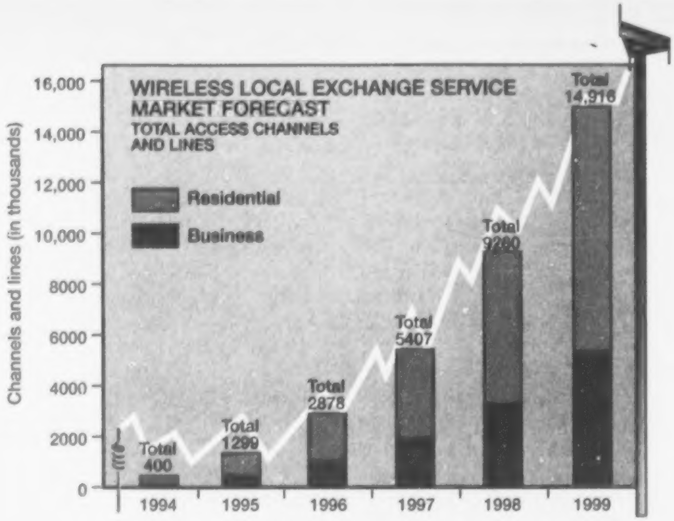
BT and Telecom Finland.

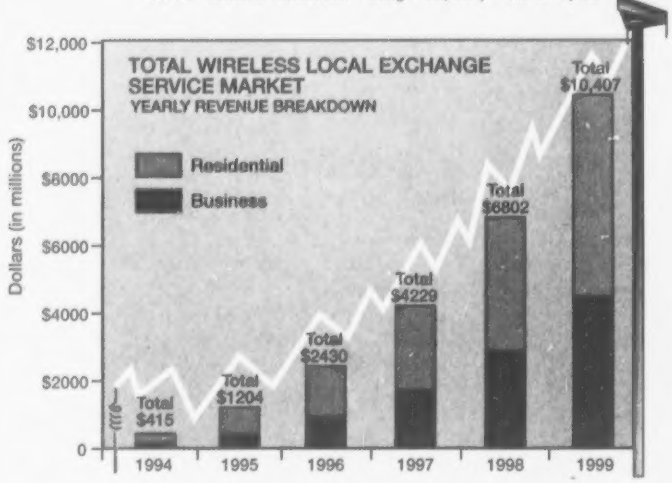
"The Asian market is evolving a little more slowly than Europe," said Brian Button, StrataCom director of marketing. Much of the frame relay activity, he added, is being spurred by international carriers and value-added network providers.

Currently, a branch of Union Bank of Switzerland in Japan is using frame relay from a StrataCom IPX, according to Mike Matthys, senior manager of Asia-Pacific business development. That customer was supplied through Rikei.

Oki will market StrataCom's IPX 16 and 32 switches under the iOX7000 series. The two companies also are developing a 2-Mb/s interface for the IPX line. The agreement gives Oki, an NTT supplier, frame and cell relay products. ■



Source: Alexander Resources Design: *Telephony*/ Peter D. Hynes



A recent study by Alexander Resources, Scottsdale, Ariz., finds there may be greater than anticipated demand for wireless service—although much depends on the way the service is packaged. Based on a survey that avoided use of terms such as PCS and cellular, the study finds that although businesses and residences are soft on many traditional PCS and cellular applications and their accompanying costs, they did identify certain telecom requirements they thought important in the future, such as landline backup, emergency and security. These, the study points out, are easily met through wireless service.

COMPASS reports successful sailing

Ann H. Lindstrom
Assistant Editor

US West's COMPASS trial is charting a true course just a little more than a year since it was launched at SUPERCOMM '91 in Houston. In fact, the "living laboratory" has become so valuable to the company that it plans to continue COMPASS in some form or another after the five-year project is over, John Strickland, director of broadband services for U S West, said during this year's SUPERCOMM in Chicago.

COMPASS, a series of narrowband, wideband and broadband network application trials, was created to help U S West design, standardize and operate high-speed public switched digital networks of the future.

To date, COMPASS has completed two trials. Desktop video calling using DS-1 and DS-3 was conducted with AT&T. The trial connected 23 U S West executives in Minnesota, Colorado, Oregon, Washington and Arizona. AT&T also participated in a medical imaging trial using switched DS-1 at the Center for Diagnostic Imaging in Minneapolis-St. Paul (see story on page 12). The center moved CT scans and other images between four locations.

The Center for Diagnostic Imaging currently is using switched multi-megabit data service (SMDS) for imaging in the second phase of that trial. In addition, 3M Corp. is using SMDS for local area network connection in conjunction with Siemens Stromberg-Carlson, and WestNet and Colorado Supernet are experimenting with SMDS-based internetworking.

Additional trials currently under way include LAN interconnection over frame relay for Northwest Airlines; electronic real estate imaging over a narrowband integrated services digital network using Fujitsu equipment; and document imaging and image mail over NISDN for students, professors and administrators of the University of Minnesota's Carlson School of Management in conjunction with AT&T.

On tap for the 1992-1993 time frame are videoconferencing and consultation over switched DS-1, and distance learning and desktop videoconferencing over NISDN.

Although COMPASS started out with five initial projects—NISDN,

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Telephony
Global

THE CURTAIN RISES ON TELECOMMUNICATIONS IN EASTERN EUROPE

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COMPANIES

MONDAY, JULY 6, 1992 Volume 223, No. 1

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

COVER STORY 26

CURTAIN RISES ON TELECOM IN EASTERN EUROPE
By John Williamson, Steven Titch and Peter Purton. Although the need for new telephone networks is universal across Eastern Europe, the progress in introducing new technology is not. This country-by-country look gives you a peak under the lifting Iron Curtain, showing where they are going and what types of technology they expect to use
Computer-illustrated cover by Peter D. Hynes

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CRISIS LOOMS FOR RHCs 8
Local exchange competition will trigger significant restructuring of telco holdings, say analysts

MOSCOW AFLUSH WITH TELECOM VENTURES 9
Efforts to bring first-class telecom capabilities to the capital and hub of the former Soviet empire are moving forward at full speed

SW BELL SHAKES THINGS UP 10
In a move to better respond to its customers, Southwestern Bell reorganizes its telephone operating companies

AMERITECH ISSUES FITL RFP 11
The company helps boost the fiber-in-the-loop market by pledging to deploy 1.5 million access lines of fiber over the next three years

GTE OFFERS FRACTIONAL T-1 14
The Independent plans to offer the cost-effective service as a gateway to existing fractional T-1 services from interexchange carriers

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By Allan R. Lamberti. Wireless communications meet Eastern Europe's criteria for expanding its countries' communications systems. In many Eastern countries with rapidly increasing telecom needs, microwave has become the communications tool of choice

ALBANIA MODERNIZES PHONE SYSTEM 34
By Larry Luxner. After half a century of repression, cut off from the rest of the world, Albania is now under democratic rule. One of the first steps for the new administration is to find foreign investment to help update the country's antiquated phone system

PERSPECTIVES 48
By Carol Wilson. Mass marketing videotex may have turned out to be a pipedream for local exchange carriers. But believe it or not, LECs can make something big out of information services

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including a network interface device that sits on the customer premises and a D-4 channel bank plug-in card at the serving office. The service makes use of four-wire copper circuits and does not require repeaters.

Fractional T-1 service has been available from interexchange carriers for about a year for applications including videoconferencing, local area interconnection and high-speed mainframe connections. However, local access to those services has mainly called for costly T-1 circuits.

GTE will try to take advantage of the existing IXC fractional T-1 market by initially positioning its offering as an affordable access service to inter-LATA, interstate fractional T-1 services, Dormann said.

"We felt that the most pent-up demand for this type of service was as a complementary local access product for interexchange fractional T-1 offerings," he said.

GTE will roll out tariffs for interstate fractional T-1 beginning in California in August. Tariffs for Florida and North Carolina will follow in October, with eight more states slated to be on-line by the end of the year, Dormann said.

Then, in the first quarter of 1993, GTE plans to file tariffs for intraLATA fractional T-1, beginning in California and Florida and moving elsewhere based on demand, he added.

Pricing for the service has not yet been determined, but 384 kb/s—which Dormann called the "magic number" for videoconferencing and local area network interconnection—is expected to cost about 50% to 75% of a full T-1.

GTE's overall goal is to establish a portfolio of data services, Dormann said. For instance, fractional T-1 and emerging frame relay services cover much the same bandwidth range, but should appeal to different customers for different applications, Dormann said. Fractional T-1 may even be a good access service to IXC frame relay networks, he said.

"We don't want to force customers to build a network around any particular service or technology," he said. "We're trying to provide a whole portfolio of network services to fit their applications." ■

AT&T, NT slipping in international digital CO game

John Williamson, International Editor

Major North American digital central office switching vendors AT&T and Northern Telecom are the leading suppliers of digital switching in the world today. However, the two vendors are gradually losing ground to competitors including Alcatel, Ericsson, GPT and Siemens, according to a study released recently by Dittberner Associates of Bethesda, Md.

Looking at digital CO ports installed to date, Northern Telecom leads the way with 59.97 million ports, with AT&T (58.74 million ports) and Alcatel (57.29 million ports) following close behind. Alcatel, however, has surpassed both Northern Telecom and AT&T if system lines on-order are included in the calculations (see chart).

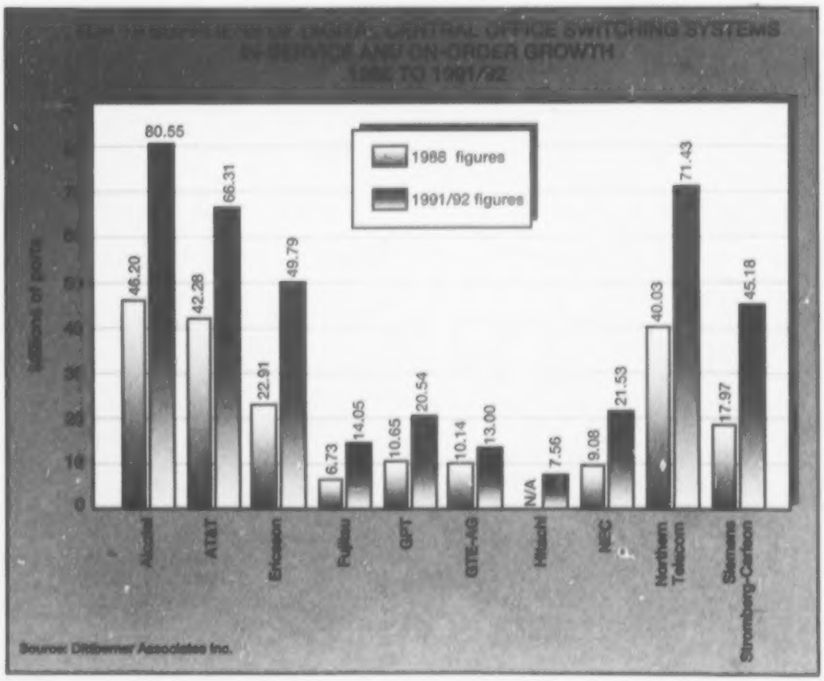
Overall, AT&T and Northern Telecom's leading competitors have made significant advances since Dittberner's last study in 1988. Ericsson has posted a 174% gain in digital lines installed, GPT 161% and Siemens 246%.

"The last few years has led to a truly astounding penetration rate of digital switching equipment for the world's telephone operating administration," said Donald Dittberner, president of the consultancy.

Including both in-service and on-order statistics, telephone companies worldwide have deployed more than 332 million digital switching ports, which represents a penetration of 53% of the total installed telephone access lines.

Significantly, a surprising number of countries, many not highly industrialized, are approaching 100% digital penetration.

These include Hong Kong, Malaysia, Morocco, Thailand, Tunisia and several Caribbean island nations. On the other hand, France, Canada and the United States, which were pioneering developers of digital switches, have subsequently achieved only 70% to 80% penetration. ■



Source: Dittberner Associates Inc.

Telephony

AN INTERTEC PUBLICATION AUGUST 17, 1992 FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET $3

A Telephony Exclusive

PURCHASING POWER:

WHO MAKES THE DECISIONS FOR THE PUBLIC NETWORK?

In the news…

TELCOS RALLY IN HOUSTON FOR REPUBLICAN CONVENTION

BLE TV OPERATOR, P TEAM UP IN DENVER

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MONDAY, AUGUST 17, 1992 Volume 223, No. 7

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

COVER STORY 28

PURCHASING POWER: WHO MAKES THE CHOICE?
By Carol Wilson. Since divestiture, the RHCs' monolithic purchasing machine has taken on many different faces. Mergers, company restructuring and competition have all molded these different purchasing approaches. Based on original, in-depth *Telephony* research, this insider's look at LEC purchasing gives a detailed view of who is actually planning today's public network.

Computer-illustrated cover by Peter D. Hynes

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CARRIERS EQUIP REPUBLICAN CONVENTION 8
An array of local, interexchange and cellular carriers will make sure convention delegates can communicate in Houston this week

CABLE COMPANY, CAP TEAM UP 9
Teleport Denver and Mile Hi Cablevision pool their resources with a unique dual-conduit network project

TELCOS, INFO PROVIDERS LOOK TO PARTNER 9
The information services industry is bringing together former and sometimes present rivals

SONET COMES TO MISSISSIPPI 9
BellSouth turns up an OC-48 SONET link between Grenada and Tupelo, Miss., using AT&T gear

NTT STOCK TAKES A HIT 16
An NTT plan to boost its share price by permitting foreign ownership appears to have backfired. In early trading the carrier's stock tumbles amid a massive sell-off

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FLYING HIGH AT TELEPORT 24
By Steven Titch. Characterized as everything from a "cream skimmer" to a telco motivator, Teleport has nonetheless made its mark on the the telecommunications world. Now inarguably off the ground and flying smoothly, the competitive access provider is ascending to a new phase of development with its heavy CATV backing

PERSPECTIVES 44
By Michael Warr. Although a research collaboration between a U.S. and a Japanese manufacturer may be call for celebration. But Bellcore staff cuts may be bad news

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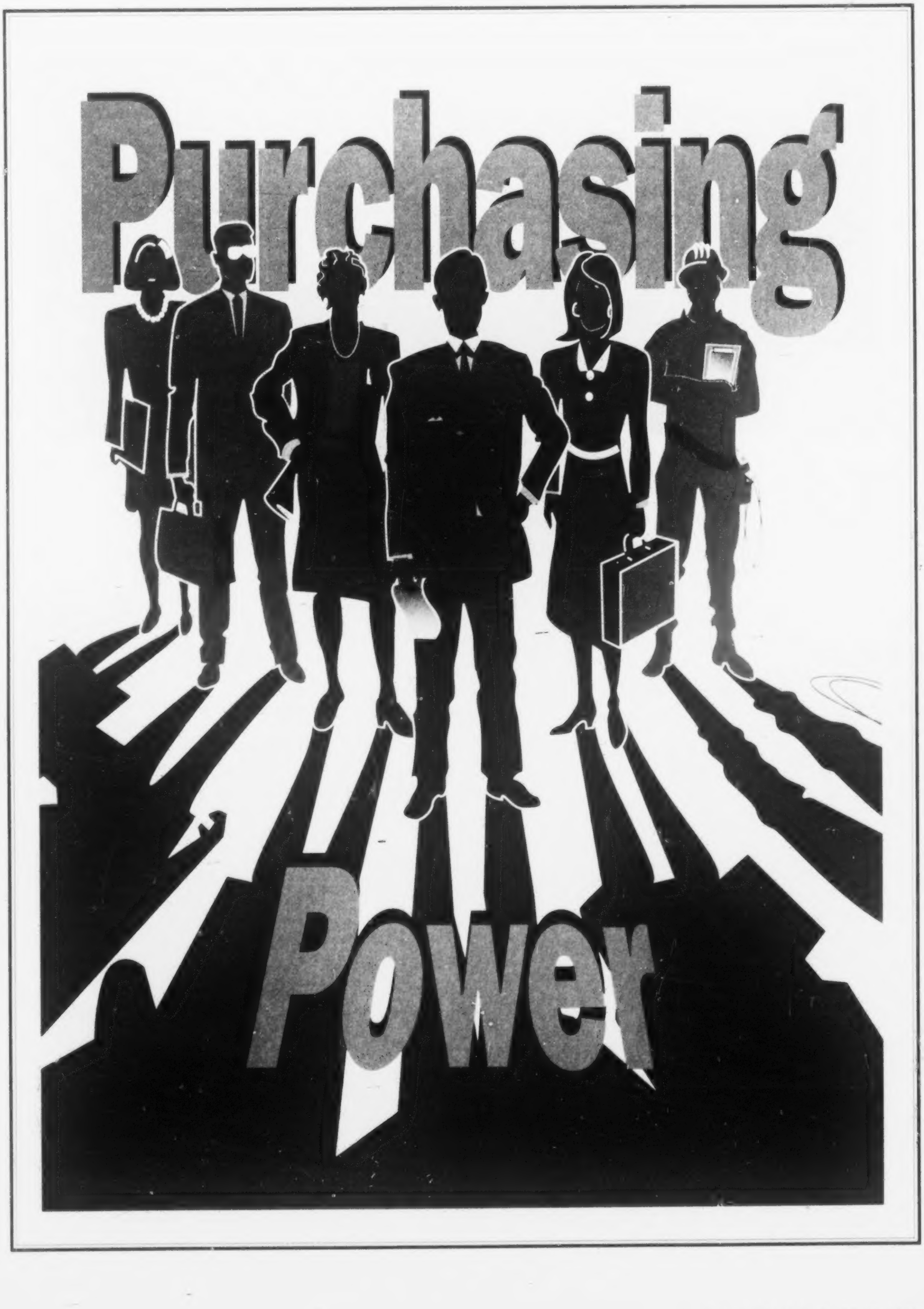


Purchasing
Power

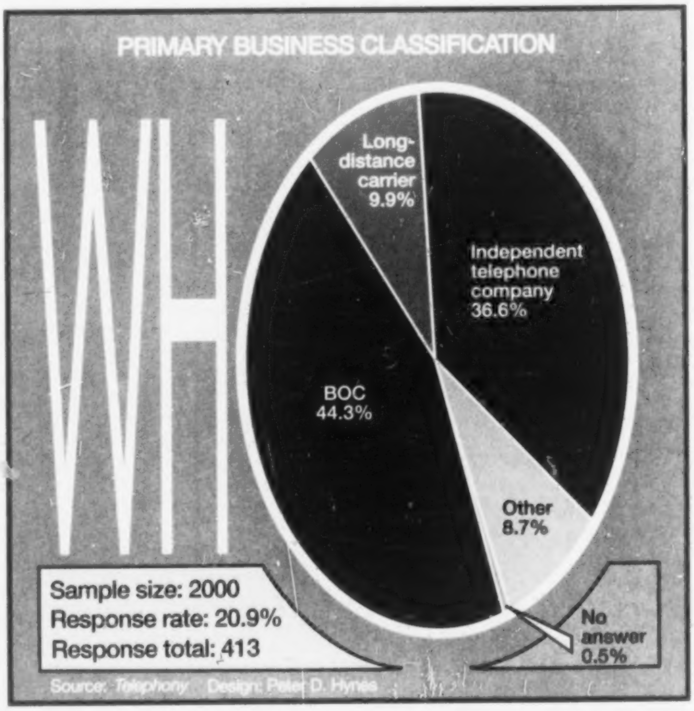
Who makes the choice?

Exclusive Telephony *research shows public network carriers are changing their purchasing process to meet changing demands*

CAROL WILSON, Editor

In their drive to introduce new technology while still controlling costs, public network carriers are driving purchasing authority to the very top and very bottom of their management organizations.

At the same time, many local exchange carriers continue to rely on the recommendations of middle management committees in selecting vendors and determining which products to approve. And a trend is building, initially at Independents, to centralize equipment purchasing.



Source: *Telephony* Design: Peter D. Hynes

Those were the major conclusions of a *Telephony* survey conducted in June of purchasing habits of LEC's and interexchange carriers. The mail survey was conducted and analyzed for *Telephony* by Intertec Corporate Marketing Research, Overland Park, Kan. (Figure 1).

In less formal responses volunteered by the 413 survey respondents, the study shows a process under tremendous pressure from changing technology, the need to move more quickly to meet growing competition, efforts to gain input from marketing personnel and customers, and the internal personnel restructuring that has been common in the industry over the last few years.

Heavy pressure is also being exerted in these days of low growth and tight budgets, prompting one survey respondent to glumly proclaim, "Everything is coming down to price, price and price."

There are indications, however, that companies are dealing with these growing pressures in different ways, by either centralizing purchasing or empowering employees at lower levels.

Who's On First?

The purchasing survey found that final approval for expenditures is most often concentrated at the top of carrier organizations (Table 1). Of those responding, 42% said executive management, including presidents, vice presidents and CEOs, held final approval authority within their company.

By contrast, however, the second highest concentration of approval authority was at the man-

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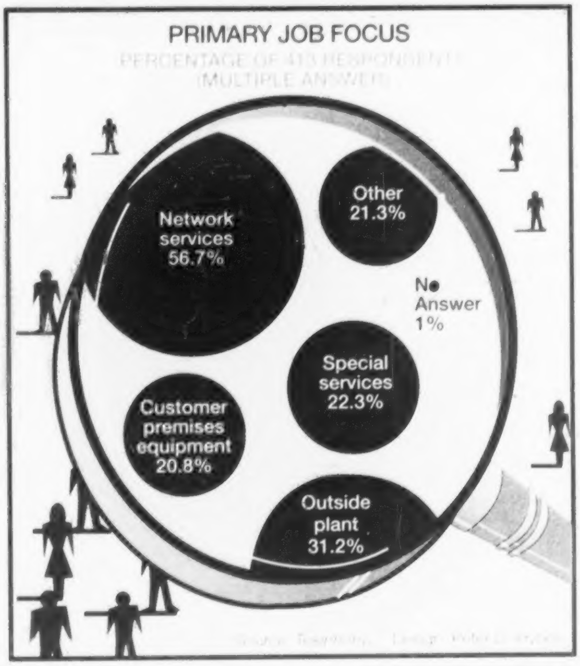


PRIMARY JOB FOCUS

PERCENTAGE OF 413 RESPONDENTS (MULTIPLE ANSWER)

Source: Telephony Design: [illegible]

The Choice *continued*

ager and department head level, according to the survey. Of those responding, 32% said these individuals were involved in approving expenditures.

These trends were slightly less pronounced at the Bell operating companies than at Independent telcos and IXC's. Survey respondents from BOC's cited executive management's approval authority 31% of the time, compared with respondents from Independent telcos (47%) or IXC's (68%). Department heads and managers were cited as having expenditure approval by 28% of BOC respondents, compared to 34% of Independent telco respondents and 44% of those from IXC's (Figure 1).

On the other hand, BOC's were slightly more likely to use committees to facilitate the purchasing process than Independents and considerably more likely to use committees to make purchasing decisions than IXC's (Figure 2). Even within the BOC community,

TABLE 1 PURCHASE ROLES ACCORDING TO JOB TITLE

	Approve Expenditures	Brand/Model Specifier	Evaluate Vendors	Influencer/ Recommender
Base = all respondents; multiple answer	413 100.0%	413 100.0%	413 100.0%	413 100.0%
Executive management (President, VP, CEO)	172 41.6%	0 0.0%	2 0.5%	38 9.2%
Support staff (Legal, regulatory, finance)	38 9.2%	6 1.5%	26 6.3%	58 14.0%
Marketing staff (Sales, customer service)	18 4.4%	41 9.9%	34 8.2%	152 36.8%
Division management-technical staff	47 11.4%	66 16.0%	91 22.0%	93 22.5%
Division management-installation/maintenance	34 8.2%	31 7.5%	41 9.9%	133 32.2%
Division management-purchasing	83 20.1%	31 7.5%	65 15.7%	36 8.7%
District management-technical staff	32 7.7%	56 13.6%	76 18.4%	81 19.6%
District management-installation/maintenance	33 8.0%	31 7.5%	33 8.0%	115 27.8%
District management-purchasing	62 15.0%	30 7.3%	50 12.1%	38 9.2%
Manager, department head	132 32.0%	39 9.4%	35 8.5%	110 26.6%
Assistant manager, supervisor	43 10.4%	41 9.9%	49 11.9%	130 31.5%
Technician	3 0.7%	39 9.4%	38 9.2%	131 31.7%
Engineer	28 6.8%	122 29.5%	68 16.5%	125 30.3%
BICSI consultant	3 0.7%	14 3.4%	8 1.9%	27 6.5%

Note: This table summarizes purchase roles for 17 job title classifications. It reflects the opinions of all 413 respondents.
Source: *Telephony*

There are indications . . . that companies are dealing with growing [competitive] pressures . . . by either centralizing purchasing or empowering employees at lower levels.

the traditional practice of making decisions by committee is fading at the BOCs' parent companies (Figure 3).

Where committees were used within BOCs, IXCs and Independents, engineers most frequently participated as committee members (50%), followed by technical staff from middle management—the division (44%) and district (36%) levels—and by department heads and managers (40%).

The survey indicates that the role of middle management in the purchasing process overall varies widely (Figure 4) but most often involves vendor evaluation and specification of brands or models.

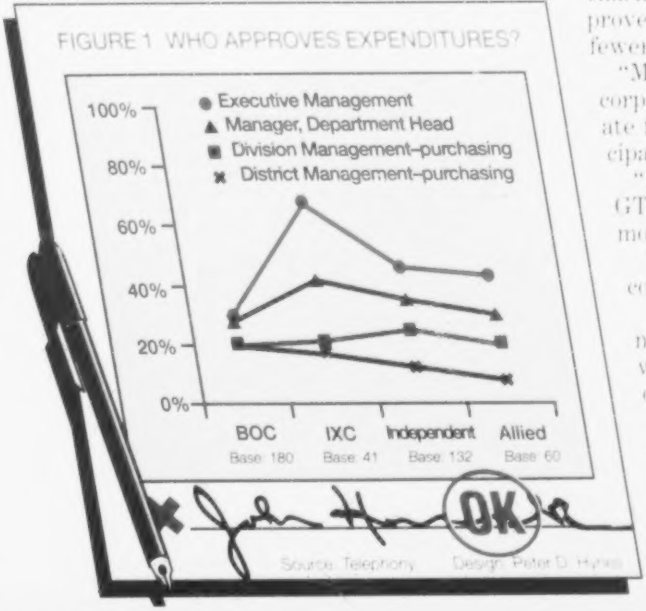
Taking one title as an example—division management-technical staff—the survey shows that at a BOC these individuals are most likely to be involved in influencing or recommending a purchase (22%), evaluating vendors (20%), approving expenditures (14%) and specifying brands or models (13%).

At Independents and IXCs, middle management personnel are more likely to specify brands or models.

Influence on purchasing decisions comes from many different job titles and job levels, according to the survey.

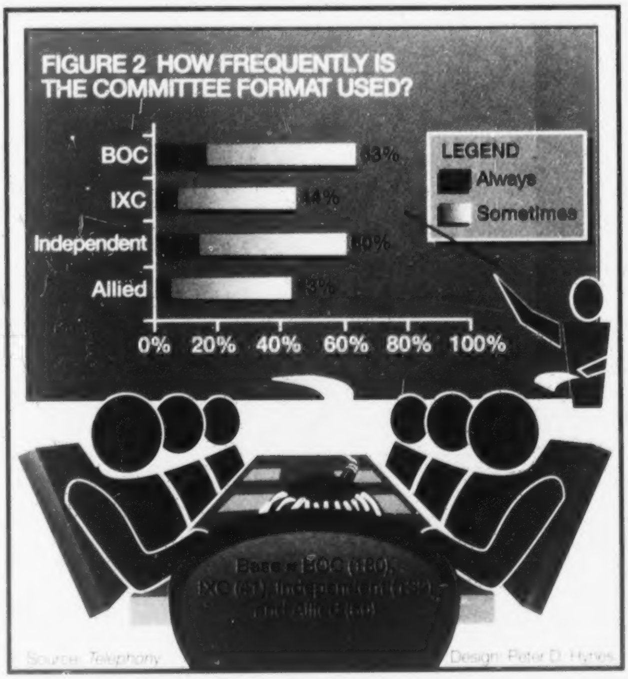
Interestingly, the same department heads that are likely to approve purchases are not likely to evaluate vendors or specify models or brands, setting up a scenario where middle management may determine the products that will make an approved purchase list, while upper and lower management ranks actually approve the expenditures.

FIGURE 1 WHO APPROVES EXPENDITURES?



Source: Telephony Design: Peter D. Hynes

FIGURE 2 HOW FREQUENTLY IS THE COMMITTEE FORMAT USED?



Base = BOC (180), IXC (41), Independent (132), and Allied (60)

Source: Telephony Design: Peter D. Hynes

Feeling Change

When asked if they felt purchasing roles are changing within the industry, a majority (52%) said yes, while 43% said no. The most frequently cited changes in the LEC community were a move to centralized control of purchasing at higher levels (11% among BOCs, 24% among Independents), and a move to push purchasing authority down to lower levels (18% among BOCs, 17% among Independents).

When asked to briefly describe the changes they see, many of those who cited more centralized purchasing said their corporations were moving to approved lists of vendors and equipment, and allowing fewer deviations from that list.

"More and more the suppliers are specified from corporate, and special permission is required to deviate from that supplier," said one BOC survey participant.

"If it's not a standard product recommended by GTE, there will be no purchase," stated another more bluntly.

The main reason cited for this centralization is cost-cutting.

"Corporate is requiring the operating companies to standardize product lines across the network and utilize mass buying to lower cost," said one Independent telco person.

But other respondents said centralization is also being used to manage rapid technological change in the network and to control quality.

Ironically, technological change was also cited as a reason for distributing purchasing authority at lower levels.

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The Choice *continued*

"As technology advances, more decisions must be made by trained technicians," said one Independent telco respondent. More authority is being delegated to lower levels which are typically more technical and knowledgeable, added another.

"Our company has gone to the field to get first-hand opinions on new equipment trials and evaluations," said a third. "We are listening to the employees in the trenches."

Particularly among BOCs, there was a clearly stated need to make purchasing decisions at levels close to the customer.

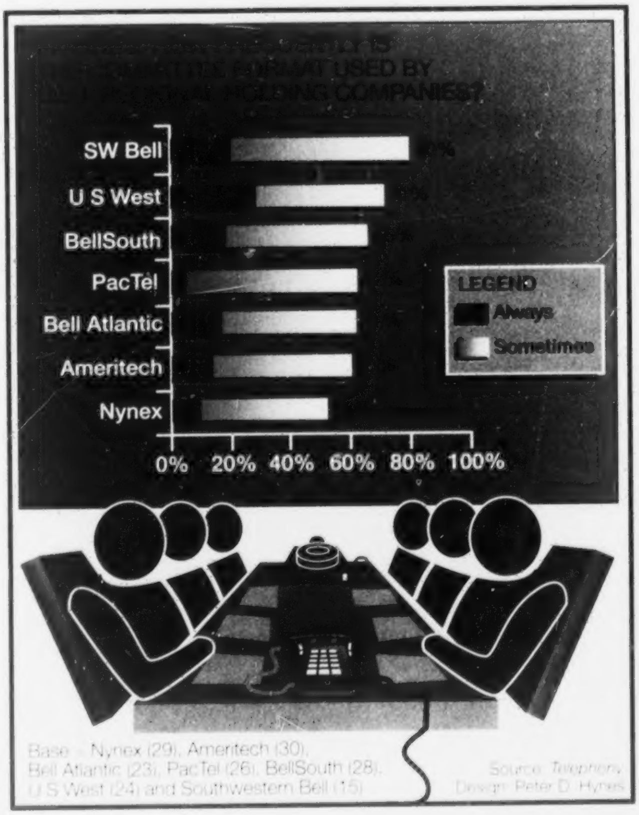
Purchasing is being driven down to the levels closer to the work and to the customer, offered one BOC writer. Customer input was rarely a factor in the past, and it is now, said another.

That need for customer input was frequently cited as one of many pressures dictating shorter time intervals for purchasing decisions.

"What we buy is more customer-driven," one BOC respondent said. "We don't have much time to evaluate the equipment requested by customers. Quicker decisions [are] required often involving promises on the part of vendor/provider. [It's] risky business if the vendor can't deliver!"

The speed with which the process takes place is clearly changing some longstanding habits. "Products must be purchased and delivered on short intervals to meet customer demands and compete with growing competition," said one BOC respondent. "We can no longer test a product for years before we sell it."

Survey results show that BOCs typically take between three and four months to complete the purchase process—depending, of course on the equipment involved—while Independents and IXCs require less time, typically between one and two months.



Base = Nynex (29), Ameritech (30), Bell Atlantic (23), PacTel (26), BellSouth (28), U S West (24) and Southwestern Bell (15)

Source: *Telephony*
Design: Peter D. Hynes

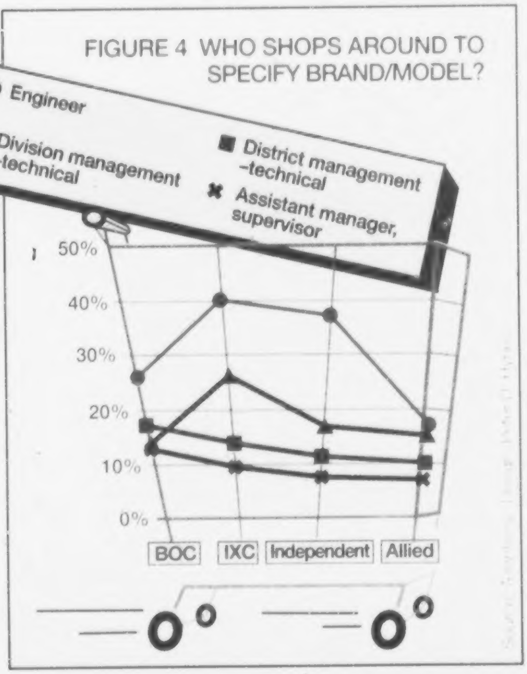


FIGURE 4 WHO SHOPS AROUND TO SPECIFY BRAND/MODEL?

The survey reflects many contradictory opinions on the purchasing process. A handful of respondents said there are fewer vendor choices, but many more cited a larger, more confusing array of vendor products. Price has become the overriding factor in making purchasing decisions, according to 12% of BOC respondents and 6% of Independents. A few others from both camps said their companies were making long-term vendor commitments based on quality and future technology migration.

IXCs, which have been dealing in a competitive world for a much longer period of time, don't see their purchase process changing. Less than one-fourth of all respondents cited change as an element. Of that number, half cited movement of decision-making lower in their organization as the primary change.

Based on the comments volunteered on the issue of change, it is clear public network carrier personnel feel a growing pressure from many sides. Customers, marketing personnel, legal staff, cost-conscious management and even over-enthusiastic vendors were all cited as making today's buying environment more difficult.

"There are many more choices," said one BOC person. "It is more difficult to evaluate equipment for service/cost performances, and to determine what is best for any given condition."

Given the growing competition that public network carriers face, there obviously will be more stress ahead for the traditional purchasing process, making more change a certainty. ■

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In the news. . .

AMERITECH AWARDS FITL 'MEGADEAL'

CARRIERS SCRAMBLE IN HURRICANE AFTERMATH

MONDAY, SEPTEMBER 7, 1992 Volume 223, No. 10

Telephony

FOR TODAY'S COMPETITIVE PUBLIC NETWORK MARKET

COVER STORY 30

ASIA'S FIBER GLOVE
By John Williamson. Lightguide technology fits the bill for the Asia/Pacific's long-haul telecommunications needs, with its short history of basic telecom infrastructure, geographically dispersed population. As evidenced by these regional updates, fiber subsea systems are helping to meet the area's demand for reliable, high-capacity, low-cost links, due to booming economies

Cover photograph by Harvey Lloyd, The Stock Market

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AMERITECH AWARDS FITL CONTRACTS 8
DSC and Raynet come up winners as Ameritech pledges to deploy up to 2.5 million fiber lines by 1995

CARRIERS CLEAN UP AFTER ANDREW 9
Getting storm-ravaged Florida and Louisiana back in service proves a challenge to area telephone companies

CUBAN PHONE SYSTEM NEARS COLLAPSE 9
A deteriorating telephone system is only one of the major problems facing this island nation

BELLCORE SETS ADVISORY BOARD 12
The Bell research arm establishes its first advisory council to get fresh views on technology and society

STRATACOM SCORES IN JAPAN 14
The vendor will supply its IPX frame relay switches to an NTT subsidiary

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Telecommunications in China: Financing, debts and future growth

LIN SUN

China's telecommunications industry is experiencing the fastest growth in its history. During the 1980s, the industry achieved sustained double-digit growth. Revenue increased 24%, and public network switching capacity grew 11%. Such strong growth was bolstered by an increasing investment scale that grew at an astounding rate of 25% a year during the last decade.

In China's recent eighth five-year plan (1991-1995), and its 10-year economic and social development plan (1991-2000), telecom has been given high priority.

The Ministry of Posts & Telecommunications, says that China's telecom industry is expected to invest 35 billion yuan ($7 billion) between 1991 and 1995, which translates to a 75% increase over the previous five-year period. By the end of the next decade, China should have achieved its goal of 33.6 million phone sets, or about three sets for every 100 people.

China's goal to almost triple the national telephone penetration in less than 10 years is a serious challenge. The nation's switching capacity will have to increase at least 15% a year to keep up.

The country's telecom industry boomed in the mid-1980s, propelled by economic reforms at home and the changing international telecom market that favored developing countries. China's telecom imports reached a peak in 1986; more than 70 transactions worth billions of dollars took place.

During the mid-1980s, the domestic market grew at an unprecedented pace; all major indices showed strong growth. Specifically, revenue increased 30% a year between 1986 and 1990. Switching capacity and the number of telephone sets increased 15% a year during the same period.

Encouraged by progressive policies in technology transfer, new technologies and products such as packet switching, digital microwave and fiber optic transmission were introduced rapidly, and there was increased research and development focused on the integrated services digital network, data communications gateways and various enhanced services.

With the rapid expansion that occurred in the 1980s, the centralized government financing soon showed serious deficiencies in allocating sufficient funds for both local and central expansion. According to the MPT, central financing decreased dramatically during the 1980s, from 60% of total telecom investment in 1983 to less than 9% by 1989.

TABLE 1 FINANCING PROVISION AND NETWORK STRUCTURE

Network types	**Financing schemes**
Transnational/ Tier 1	MPT
Interprovincial/Tier 2	Provinces and MPT
Interprovincial/Tier 3	Provincial bureaus
Intercity/Tier 4	City bureaus

In Guangdong (Canton) province, a locality with strong telecom growth, central financing decreased from 60% in 1980 to a meager 3% by 1987, while local self-financing increased more than 30 times during the same period.

TABLE 2
CITIES IN HIGHEST DEBT (1989)

Localities	**Debt ratio***
Tianjin	51.8%
Shanghai	42.9%
Guangdong	22.3%
Beijing	17.6%
National average	18.9%

*Debts proportional to total annual investments

Source: MPT, 1991

The investment constraints and rapid growth forced the MPT to adopt a diversified financing policy, which transfers financing responsibility from the central government to local telecom authorities. Besides continued, but reduced central investment, the new policy encourages local telecom bureaus, enterprises and institutions to use all viable financial resources. These resources include local government and self-generated funds, and domestic and foreign loans.

Loans have had a dual effect on the industry: They provide foreign exchange for new technologies and products, but also have contributed to a growing national debt.

The MPT is primarily responsible for transnational—or Tier 1—networks, and local bureaus provide finances for provincial and regional networks (Table 1). Diversified financing gives local telecom bureaus more freedom. They can independently determine projects and funding scales and retain higher profits, as long as they meet tax requirements and regulations in technical standards, pricing and services. As a result, local communications infrastructure has generally improved in recent years.

Now that financing responsibility is done locally, profits depend on services, triggering rampant price increases. Since 1989, prices for local services have increased 30% to 100%. The price hike, however, is widely viewed in China as a natural adjustment from heavy government subsidies to more balanced market dynamics.

Despite the increases, the service waiting list also has soared, which indicates that consumers are willing to pay higher prices. The increases have provided a substantial pool of subscriber financing for service expansion and helped reduce debt loads.

The diversified financing policy also encourages foreign investments. Although foreign investments in China's telecommunications is a recent phenomenon, growth has been remarkable. Many foreign loans and joint ventures have been designated to local projects, bypassing the MPT. Because additional access to foreign exchange has become available, local bureaus can direct-

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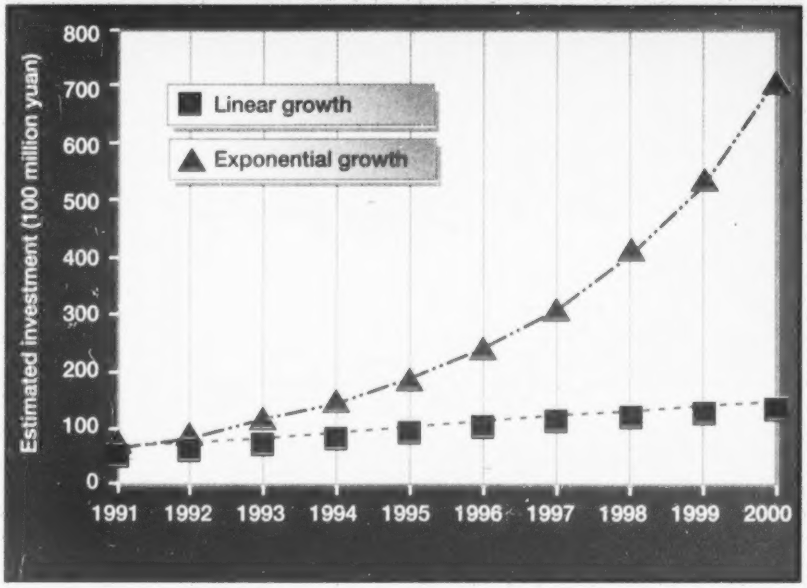
ly purchase foreign products, especially in regions where the economy and foreign trade is booming.

Because of the size and diversity of China's telecom market, the government may have to continue diversified financing as a long-term strategy. Decentralized financing has encouraged telecom investment, spurring growth.

China's telecom investment currently comes from three sources: state budgets, internal accumulation—including local government investment and enterprise revenues—and external sources such as loans and joint ventures. The MPT says by the end of 1989 China's telecom industry debt totaled 5 billion yuan; 60% was for basic construction (including plant and central office installation), 40% for system upgrading.

FIGURE 1 FORECASTING SCENARIOS FOR TELECOM INVESTMENT (1991-2000)



In both basic construction and systems improvements, foreign debts have accounted for 63% and 55%, respectively. Urban networks accounted for about 66% of the debt, compared to long-distance networks, which had little debt. Since most urban networks are constructed and managed locally, the debts are heavily weighted in provinces and cities whose infrastructure is comprised mainly of urban networks. Table 2 shows the localities with the highest debt ratio at the end of 1989.

The MPT believes China's telecom debt structure should be based on the nature of local networks and the pace of growth. For major cities such as Beijing, Shanghai, Guangzhou and Tianjin, the debt ratio can be as high as 40% because they have enormous urban networks and their repayment ability is higher. For remote and less developed areas that have primitive systems and produce little profit, the debt ratio should not exceed 10%. The MPT hopes such debt distribution will help accelerate urban network growth that accounts for more than 80% of all traffic in China, even though the average connect ratio is only 60%.

Compared to long-haul networks, urban systems will benefit from high demand and fast turnover in services, which makes it easier to repay debt.

Nonetheless, debt management in the 1990s could be a cause for concern. First, with many loans due by the early 1990s, China's ability to repay its debt will likely decrease. According to an MPT report, by 1995 the debts due will decline by as much as three times from 1989. Second, during 1991-95 China will increase investment in urban and long-distance networks, creating a reserve disparity of 20 billion yuan, aggravating investment constraints. Finally, to compensate for its debt, China will have to continue borrowing money.

Debts for the urban networks should remain heavy throughout this decade, but foreign loans may decrease in proportion to domestic loans because of stringent controls on foreign exchange expenditures and increasing domestic production and sales. Debts for long-haul networks will remain low because they depend less on cumulative investments and increasing rate of return over time.

The future debt structure must

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Where's the money?

China's diversified financing scheme depends on enterprise financing, user financing, loans, foreign investments and joint ventures.

Enterprise financing comes from sources such as telephone companies and product sales. Profit from phone services (including installation) will become the major source for enterprise financing, and it is expected to increase significantly because of an expanded user base and increase of service volume. User financing can be expanded from user premises installations (that is, PBXs and phones) to regional exchange, such as in the new industrial areas. Agreements can be made between local users and service carriers. Other alternatives can be explored in the future, such as selling telecom bonds to attract public financing.

Past experience indicates that local bureaus prefer government loans to bank loans because of lower interest rates and longer lending periods. Since the telecom industry requires long-term investment, loans with low-interest rates and longer terms are expected to grow.

Government concessional loans and commercial lending will be the major sources of financing in the 1990s. Although direct investment by foreign companies is encouraged, strict Ministry of Posts & Telecommunications regulation and government ownership will make direct foreign investment limited unless the industry is further decentralized to mixed ownership and management.

Successful joint ventures will continue to be an effective means for technology transfer and attracting foreign capital. They increase production, improve quality and also facilitate Western management, training and marketing that will help improve the quality and sales of Chinese products.

also consider industry efficiency and the dynamic relationship between market supply and demand. With dismantled government subsidies, the price for urban services has increased dramatically, thus creating an enormous revenue source for local carriers. According to MPT estimates, by 1995 total revenues from price increases alone will be 1.7 billion yuan, with a profit level of 20%.

As a result, debts for urban networks can be reduced by 10 billion yuan to 5.3 billion yuan by 1995. The MPT expects that by the end of 1995 the overall debt ratio will be reduced to 11%.

An analysis of the debt suggests an aggressive government policy to encourage continual local autonomy and financing diversification such as lower or exemptible taxes, lending in generous terms and contingent policy on foreign exchange expenditures.

Growth in the 1990s

Investment in the 1990s should grow from about 6.5 billion yuan in 1991 to 14.4 billion yuan by 2000 (without outstanding debts). But the annual growth rate is only about 7.9%, and this investment increase will be unable to sustain the projected growth. To have 33.6 million telephones in place by 2000, for example, the annual growth rate must be maintained at 15% or higher. This translates to an annual investment increase of 20% to 25%. If an upward investment scale of 20% a year is used, then 12 billion yuan is required by 1995, and 25 billion yuan by 2000.

Exponential growth is an alternative scenario (Figure 1). Using the exponential smoothing technique and ignoring seasonal factors, the scenario indicates significant growth around 1995. In addition, the scenario suggests a dramatic increase in investment to 70.5 billion yuan by 2000 from about 6 billion yuan in 1991, or an average growth rate of 31.6% for the 1990s. The exponential scenario, although obviously sufficient to meet China's goals, is unlikely.

These scenarios provide a framework for studying the future of Chinese telecom. The actual investment level probably will fall between the linear and exponential scenarios, depending on market and extraneous factors.

It is also possible to forecast the effects of estimated investment based on growth trends in the 1980s. Estimates for switching capacity and number of telephones are created with the previous linear and exponential investment models.

If the linear scenario is used, the switching capacity will increase to about 30 million lines and 32 million phone sets by 2000. If the exponential scenario is used, the growth will be 128 million lines and 141 million sets, respectively.

In the linear scenario, growth for both switching capacity and number of phones is somewhat below intended goals. But it will be impressive if the current momentum is maintained throughout the 1990s. The exponential scenario, on the other hand, shows dramatic growth, especially during the second half of 1990. It also requires a much higher investment.

How to increase industry financing is China's main dilemma. Future development relies heavily on increasing investment. Despite a strong commitment by the central government, the scale of central investment will likely stabilize with relatively little increments. The industry's growth in the '90s will depend on diversified financing.

The continuing dichotomy of power between the central and local governments will affect diversified financing throughout the 1990s. The long tradition of local autonomy in China is the result of a lack of policy directives and enforcement. Such inconsistency has created great opportunities for local telecom bureaus and enterprises to profit by providing better products and services in local markets.

Diversified financing is essential for China's growth in the 1990s. Policy-making must provide greater incentives to encourage local participation, autonomy and more profit retention. Prudent government policy will significantly improve the country's financial viability and promote technological advancement. ■

Lin Sun is a Telecommunications Consultant based in San Francisco. This article is based on a recent report on China's telecom financing and growth.

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LINKING TELECOMMUNICATIONS AND ECONOMIC COMPETITIVENESS

Part one of two parts

FRANCIS J. CRONIN, PAUL HEBERT and ELISABETH COLLERAN

The issue of competitiveness is increasingly coming to dominate local, regional and national economic debates. Within the U.S., the decade-and-a-half-long string of sizable trade deficits has called into question the United States' ability to compete effectively in the international marketplace. Policy-makers, both here and abroad, have begun to focus on understanding the factors affecting an economy's ability to compete and grow.

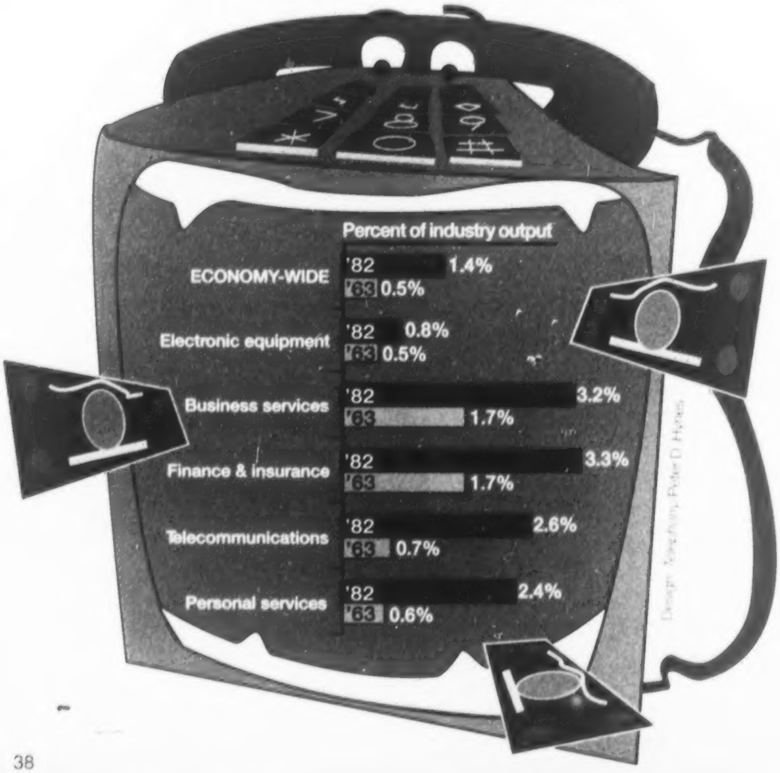
Central to this discussion is the efficiency with which inputs such as labor, capital, materials and energy are combined in the production process—what economists call total factor productivity.

Traditionally, economists have examined capital and labor as the underlying drivers of growth. More recently, this analysis has been extended to account for improvements in the "quality" of capital and labor inputs as a result of such factors as research and development, and education.

In the 1980s, economists further expanded their concept of inputs to include public infrastructures. Public infrastructures such as transportation systems were recognized as pervasive networks with substantial implications for the productivity of the nation. In the past couple of years the concept of productive infrastructure has itself been expanded to encompass public networks owned, operated and maintained by private companies such as the U.S. telecommunications network.

The importance of identifying telecommunications as a productive input is undeniable. Many of today's high-growth industry prospects lie with information-intensive industries whose ability to communicate is critical to their ability to conduct business. Recent policy debates around the globe have begun to focus on the linkage between telecommunications and economic growth and competitiveness.

FIGURE 1 TELECOMMUNICATIONS CONSUMPTION IN CONSTANT DOLLARS (1963-1982)



As a result, a number of jurisdictions are assessing the benefits of alternative telecommunications infrastructure modernization programs. What particular types of investment programs would impact the economy most favorably? Would the associated benefits exceed the cost? Over what time frame should the new network be deployed? What are the implications for specific segments of society such as low-income, elderly or disabled households; urban vs. rural economies; or public safety?

Over the past three years, researchers at DRI/McGraw-Hill have conducted the first and, to date, only comprehensive quantitative assessment of the contributions of telecommunications infrastructure modernization to the national and individual state economies. In this article, we describe the pervasive, profound and positive impacts that network modernization has had on the U.S. economy during the past 30 years.

The identifiable and measurable effects of network modernization include increased telecommunications production efficiencies, lower real service prices, increased end user productivity induced by higher usage, lower economy-wide inflation and increased international competitiveness.

Investment, Productivity & Prices

The modern development of the U.S. telecommunications infrastructure has undergone three general stages. In the first stage, from the 1930s through the 1950s, telecommunications development was pursued to provide universal ser-

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vice. Once this goal was effectively achieved by the mid-1960s, the U.S. set out to modernize and improve the efficiency of its telecommunications network through investment in technological innovations designed to improve service and reduce the cost to customers. Since AT&T's divestiture in 1984, however, no clear public policy vision has directed the development of the telecommunications network.

To determine the effects of the earlier heavy investment period, we will focus on the early 1960s to the early 1980s. During these two decades, the U.S. undertook investments in telecommunications such as the widespread deployment of direct long-distance dialing, digital transmission facilities, satellite communications, the replacement of electromechanical switches with computer-controlled electronic switches and later with digital switching, and the extensive deployment of common channel signaling in the U.S. long-distance network.

During those two decades, public infrastructure investment experienced virtually no real growth; in fact, when measured relative to the gross national product, public infrastructure investment is found to have declined 40%. Telecommunications and gross private investment have shown significant real growth, with telecommunications investment growing more than three times and gross private investment more than two times their 1963 levels. Telecom investment growth has generally been about 50% greater than gross private investment growth.

Driven by these investments, the telecom industry increased its production efficiency to an extent unparalleled by any other U.S. industry. In fact, the total factor productivity of the industry climbed 3.1% per year, while productivity in the economy as a whole remained unchanged.

Almost as remarkable was the steadiness with which the telecommunications industry improved its productivity. It was one of a small set of industries generating substantial resource savings through the late 1970s, when most of the economy lapsed into a period of efficiency losses and was the only industry to lower its requirements in all three input categories (labor, capital and materials). Although decreases in real labor requirements were responsible for the majority of telecommunications efficiency gains, capital and materials requirements also dropped.

TABLE 1 RESOURCE SAVINGS DUE TO IMPROVED TELECOMMUNICATIONS

Savings	Sources of savings
$46.5 billion	Resources saved in telecommunications production
$52.0 billion	Resources saved from increased telecommunications consumption
($17.2 billion)	Resources used to accommodate increased demand for telecommunications
$81.3 billion	Total resources saved due to improved telecommunications

Design: Telephony/Peter D. Hynes

As a result of improvements in telecommunications production efficiencies between 1963 and 1982, we estimate that the nation's economy saved $46.5 billion in total resources in 1982.

These efficiency gains enabled the telecommunications industry to lower its price relative to the prices of other goods and services. Between 1963 and 1982 the price of telecommunications services fell 47% relative to the GNP price deflator and 49% relative to the average wage rate. Only two other industries—electrical machinery and textiles—cut relative prices by even half these amounts.

These changes not only revolutionized production processes in the industry itself, but affected the broader economy, particularly because telecom services are a vital and pervasive input into the production process of other sectors.

Industries throughout the U.S. economy responded to these price reductions by increasing consumption of telecommunications in their own production processes. The average industry spent 53¢ on telecommunications services to produce one unit of output in 1963; by 1982 it spent $1.43 (Figure 1). This represents a 167% increase in intensity of telecommunications usage, for a compound annual growth rate of 5.3%.

During that time, aside from personal services, no other industry experienced more than a 2% per year increase in use by any other sector in the economy. Most of the increase in telecom usage occurred in non-manufacturing sectors: Between 1963 and 1982, non-manufacturing usage of telecom climbed at a compound rate of 5.5% per year while manufacturing usage grew 3.7% per year. Virtually every industry expanded its usage of telecommunications per unit of output during that period.

Clearly, the advancement in the quality of telecom and the decline in real prices contributed to a dramatic increase in the consumption of telecom services. From a social viewpoint, however, the true value is the additional resources made available as telecom usage displaced less efficient and more costly resources.

To determine this, we estimated how user production processes would have been altered in 1982 if the advancements in telecommunication services between 1963 and 1982 had not occurred. We used a sophisticated econometric analysis, incorporating industry-specific production functions to develop a profile of the substitution possibilities available across industry sectors and the rates at which other resources can be substituted for telecommunications while maintaining output levels. In other words, industries would have had to increase their usage of such substitutes as labor, courier services or business travel to compensate for not being able to increase their use of telecommunications. This behavior is reflected in the substitution ratios developed using our state-of-

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the-art econometric model to relate the usage of capital, labor, materials and telecommunications by each industry to the prices of each input, the consuming industry's output, technology and the industrial structure of each industry.

The results of this complex analysis reveal that, in 1982, the average industry saved $1.64 (inflation adjusted) in other costs for every additional dollar spent on telecommunications. This savings was comprised of a 60.8% savings in labor costs and 39.2% savings in capital and materials.

For specific industries the cost savings were indeed extraordinary. For example, the same analysis demonstrates that the real estate sector could save $5.36 for every additional dollar spent on telecommunications in 1982 as compared with 1963.

With these estimates of resource substitutions across industry sectors, it is possible to estimate the total savings to the U.S. economy in labor and capital inputs in producing the 1982 level of GNP that results directly from advancements in telecommunications infrastructure between 1963 and 1982. We estimate that increased use of telecommunications saved the 1982 economy $52 billion in labor and capital. This savings was offset by a $17.2-billion increase in resources needed by the telecommunications industry to accommodate increased demand, for a net savings of $34.8 billion.

Table 1 shows how the combined impacts of improved production efficiencies by the telecommunications sector and increased telecommunications consumption by other sectors saved the 1982 economy $81.3 billion in labor and capital. In other words, had these gains in telecommunications efficiency not occurred, the economy would have had to use $81.3 billion more in primary inputs to achieve the level and composition of GNP actually produced in 1982.

The efficiency gains that have been attributed to advancements in telecommunications infrastructure in this time period have been reflected in the relative prices of other goods and services. Our analysis indicates that the U.S. Consumer Price Index in 1982 was 7% lower than it would have been without the increased used of telecommunications.

This may appear a rather esoteric measure, but since changes in the CPI greatly influence labor contracts, entitlement pay-outs, the standard of living and international competitiveness, it is an important yardstick for the value of telecommunications infrastructure to general economic well-being.

In fact, additional analysis by DRI reveals that this inflation-fighting property of telecommunications investment had a sizable impact on the U.S. trade position. Between 1977 and 1982, DRI calculates that U.S. exports increased by more than $50 billion as a result of our increased international competitiveness induced by telecom infrastructure improvements.

There are many ways in which the telecommunications sector, through infrastructure investment and the resulting efficiency gains and service price declines, improved the U.S. economy. Yet, it is often useful when comparing alternative investment activities to develop one overall measure that defines all societal benefits.

One way economists seek to quantify such societal impacts is through a cost/benefit analysis. DRI has developed analytics that discount the total flow of costs associated with the telecom infrastructure investment relative to the benefits to society. By the end of the time frame under analysis, benefits greatly exceed costs. In fact, the excess of discounted benefits over cost approaches 110%. This indicates a rate of return for society substantially greater than the rate employed by the federal Office of Management and Budget as a hurdle rate for the selection of public projects.

This private infrastructure investment profile, pursued by the U.S. telecom sector, has had a positive and profound effect across all dimensions of society, which may well be ahead of many public "social" investment programs. ■

Francis J. Cronin is Managing Director, and Paul Hebert and Elisabeth Colleran are Senior Associates of DRI/McGraw-Hill's Business Services Group, Lexington, Mass. Part two of this article will appear in the Nov. 2 issue.

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